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Automobile
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AUTOMOBILE JOURNAL

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VOL. LXIV.

AUGUST 10, 1917.

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FINDS THE LEAK AND FIXES IT

You Don't Need to Worry About a Leaking Radiator if you Carry in your
Kit a Can of

SE-MENT-OL

V. 65 (1918)
V. 64 (1917)
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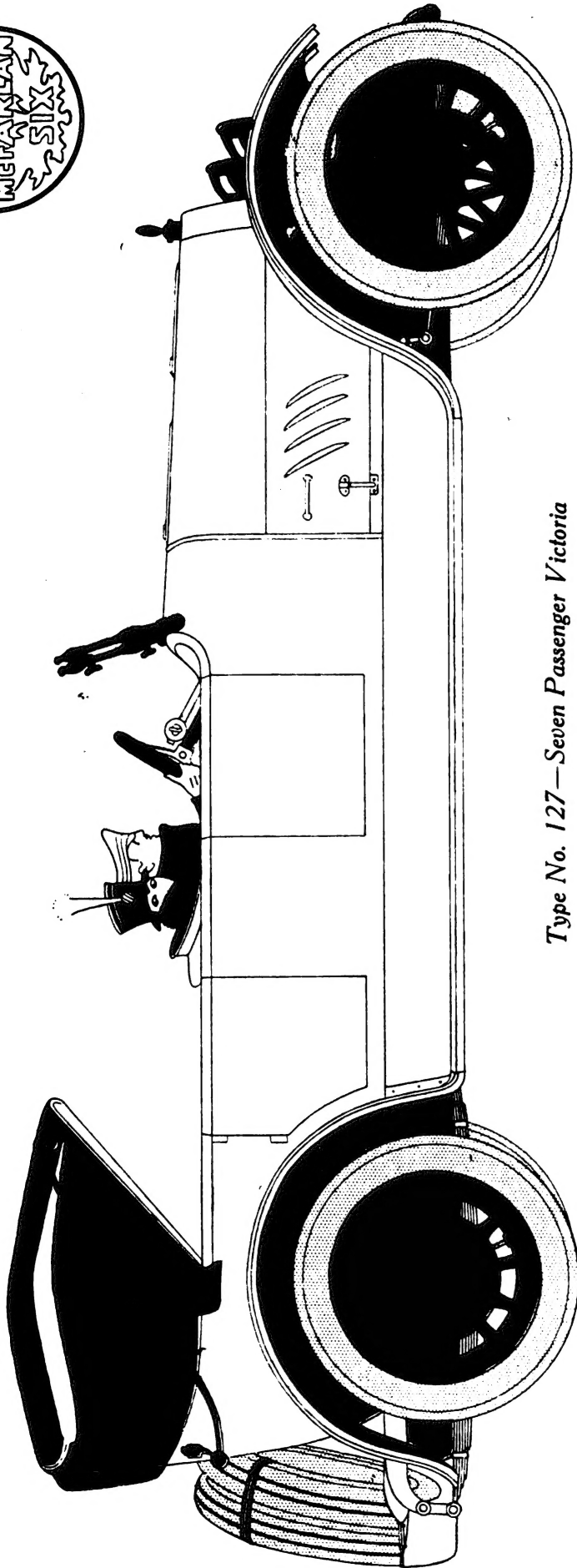
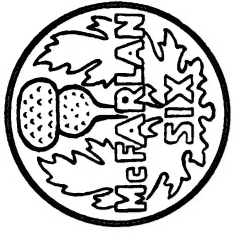
SE-MENT-OL is a dry powder. Dissolved in the hot water of your radiator, the cooler air at the edge of the leak quickly congeals it into a permanent repair. In all parts of the cooling system except at the leak, it remains in solution until the radiator has been drained and refilled. Your radiator is therefore clean after using; besides being in perfect repair.

At your favorite Garage or Auto Supply Dealer
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Manufactured by
THE NORTHWESTERN CHEMICAL CO.
Marietta, Ohio.



THE MCFARLAN NINETY



Type No. 127—Seven Passenger Victoria

THE McFarlan Motor Company offer you the result of another year's tireless effort to produce a high powered, six cylinder motor car of the highest efficiency, greatest dependability and the most correct design. Following their rigid policy of improving motor car construction wherever possible, but of adopting no change that has not been under close observation for many months, the MCFARLAN engineers have felt that they could best serve the public by directing all their thought, care, skill and energy to one chassis.

The new type cars are unusually low in appearance, immediately responsive to the call for speed or power. They are silent, restful and dependable. The McFarlan body designs which have been much sought for many years are more distinctive than ever before. For the coming season we offer the most correct designs for every requirement, both in open and closed models.

These luxurious cars are not expensive when the exclusive design and fine materials are considered.

The price for all open touring types is \$3500. Subject to change without notice. (Book 38 is now available to those interested in luxurious cars).

CONNERSVILLE

MCFARLAN MOTOR COMPANY

INDIANA

IT is not a question of what you pay for a tire, but what does a tire pay you in service and mileage.

The initial cost of a Hood Tire is slightly more than that of the usual standard tire. It is only natural that this should be so, for Hood Tires are built above the standard in every detail of manufacture.

And in the later use, under strain of road wear and long mileage, this slight addition to the initial cost is more than absorbed. It is then that Hood Tires pay you their dividends in service and satisfaction.

They wear longer—protect you with a greater margin of safety and prove that quality is economy. Try them and see.

For overnight service don't substitute. See Automobile Trade Directory and Chilton's Directory for list of Hood Tire Distributors.

THIS IS THE SIGN OF A HOOD DEALER



**Quality
is
Economy**

Hood Tire Co., Inc., Watertown, Mass.

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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

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A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

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Ford Size Tires

New 30x3½ Non-Skid

\$7.50

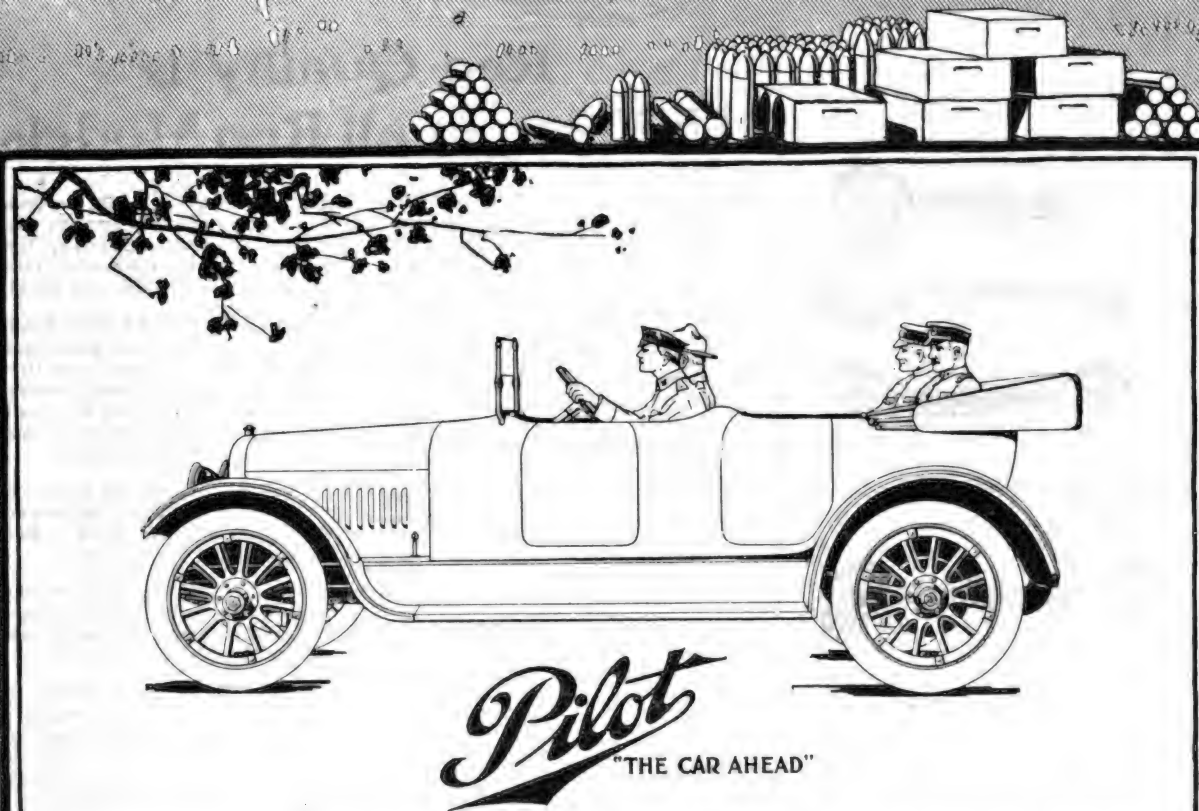
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1763 Broadway, New York

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One new Pettingill Rotary Shears; capacity No. 14 gauge, 60" throat. McCabe Boiler Wks., Newark, N. J.

AMMUNITION



THE BIGGEST ARMY in the world, with a gun for every man, can't do a whole lot of damage without ammunition. But at that they are considerably better off than an army with ammunition that does not explode.

THE FIRST BUNCH will have sense enough either to keep out of the fight entirely or "beat it" if they are already in. The second marches confidently forward only to meet sure annihilation.

ISN'T THE CASE of the average automobile dealer somewhat similar? First he gets hold of a crackerjack seller but can't get deliveries. Then he gets sore and takes on a car he *can* get deliveries on only to find that it won't sell.

WHAT IS THE REMEDY?

YOU WILL FIND IT in the Pilot Car and the Pilot Production Policy.

SINCE THE FIRST Pilot Six Forty-five was delivered two years ago the supply has never come anywhere near catching up with the demand. That is out of the question. But it has never hurt Pilot Dealers, because we never make new connections until we are reasonably sure that our production is big enough to take care of our old dealers *first* and *then* the new ones.

THREE TIMES we have doubled our production in order to widen our field of distribution; added a few new dealers and gone on again.

RIGHT NOW another 100% production increase is in full swing. We want a few live, aggressive money making dealers.

IF YOU WILL FURNISH the men we will supply the ammunition and—GUARANTEE IT WILL EXPLODE.

PILOT MOTOR CAR COMPANY

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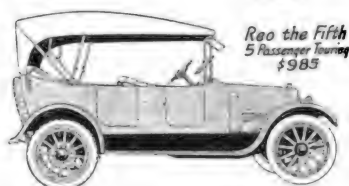
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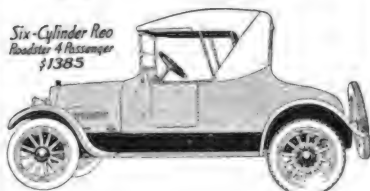
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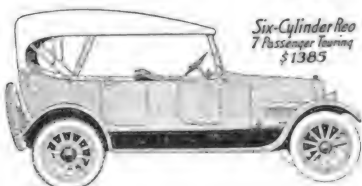
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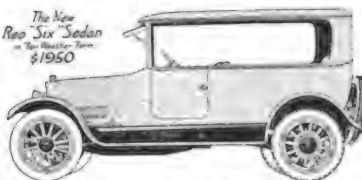
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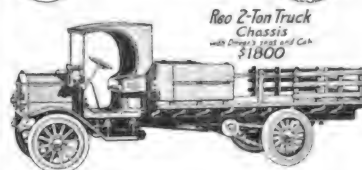
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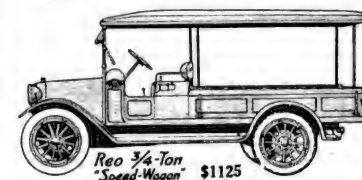
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UNTIL DEC 1ST 1917

Reo Quality is Uniform in all Reo Models

AND REO QUALITY at Reo Prices and backed by the Reo guarantee, constitutes "The Gold Standard of Values"—each model in its class.

THERE ARE NOW SEVEN Reo Models, comprising Fours in Touring and Roadster types; Sixes in Touring, Roadster and Sedan; and the two Reo Commercial Vehicles—the 3/4-Ton "Speed Wagon" and 2-Ton "Heavy-Duty" Truck.

IN THIS ADVERTISEMENT we have space only for a brief paragraph pertaining to each Reo Model—lest you forget the line is so complete that you can find the car you desire, in the type you prefer, and in a Reo.

REO THE FIFTH "The Incomparable Four" is America's most famous automobile. Standard in practically its present form for now eight seasons—"going on nine". At its present price, \$985, this car is verily "A gold dollar for ninety cents".

TO REO THE FIFTH more than to any other, is due the movement that is now so apparent—the return to the Four-cylinder type in all cars listing at less than \$1,000.

THE FOUR IS THE ULTIMATE type in that price class. Economy of upkeep, as demonstrated by this Reo model, has done much to prove the superiority and ruggedness and economy of the Four in that class of car where the buyer must count the cost and yet demands the service and the roominess.

THE FOUR ROADSTER is the handsomest model of its type you'll see on the road—at any price. And, for the present, you can get it for \$985 and freight from the factory.

OF THE SIX ROADSTER the same is true, plus the extra luxury it affords the owner at the extra cost—\$1385 f. o. b. Lansing.

THESE TWO ROADSTERS are of similar design and identical construction and are conceded to be the handsomest cars of the type—price aside.

FOR THE FAMILY that needs a car of greater capacity than five and, yet of moderate upkeep, the Reo Six Touring Car—also \$1385 for the present—knows no equal.

NO MATTER WHAT YOU PAY you cannot obtain a 7-passenger car of better design; one that represents sounder engineering; more experience; better materials and workmanship than enter into the making of this Reo Six.

THAT'S A BROAD CLAIM but we make it unhesitatingly—and you know that the word of Reo passes at par everywhere.

THE REO SIX SEDAN is the newest of all the Reo models—and therefore represents the best of Reo experience and taste.

REFINED AND IMPROVED at every point where last season's experience showed the need or the opportunity. This body is staunch in construction as well as graceful in curve and line.

AT ITS PRICE, \$1,950, you will not find its equal—nor at a thousand dollars more, its superior. We state that in all confidence too.

OF THE REO MOTOR TRUCKS the same is true. The 3/4-Ton "Hurry Up" Wagon at \$1,125 (chassis \$1050); and the famous 2-Ton Reo "Heavy Duty" Truck at \$1800—each is the leader in its own class—demand greatly in excess of factory capacity.

BUT THAT IS TRUE of all Reo models, without exception.

THAT'S WHY WE SAY "Reo Quality is Uniform in all Reo Models," the uniform over demand for all Reo models justifies the statement.

ORDER NOW if you'd have your Reo soon. Present prices are guaranteed only till December first. If you order now and specify delivery before that time, you'll get your Reo at the present price.

ALL PRICES are f. o. b. Lansing.

REO MOTOR CAR COMPANY
LANSING MICHIGAN

(When Writing to Advertisers, Please Mention The Automobile Journal.)



DEALERS

If you want to control
the battery business
in your territory

WRITE OR WIRE FOR THIS BOOK

on Permalife and the National
Storage Battery Exchange System

It explains how the National System of Storage Battery Exchanges gives constant, permanent service to the motorist.

It shows how its marked economy ends storage battery troubles for all time—for dealers and motorists alike.

It shows in innumerable ways the intensive co-operation we give dealers to make their business highly productive.

Over 500 high-grade dealers in all parts of the country are now taking advantage of the motorists' demand for Permalife. If you want your business to be the biggest storage battery business in your territory, apply for Permalife representation. The name alone will be an immeasurable asset. The book explains.

Permalife territory is being assigned rapidly. You can't delay a minute if you want to profit by our method of guaranteeing perpetual storage battery service—if you want to dominate the storage battery field. Address Department A J-8 for our book "What Permalife Is."

Permalife Storage Battery Company, Inc.
POUGHKEEPSIE, NEW YORK, U.S.A.

NEW YORK

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AUTOMOBILE JOURNAL

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Should be made by Check, Draft, Postoffice or Express Money Order, or Registered Letter. Money enclosures must be at sender's risk.

Entered as second class matter, April 15, 1896, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879.

Ten Cents
a Copy

NEW memberships in motordom are gained by campaigning for them, much on the same lines that a club or association would follow if they set out to increase their lists. This is one important reason why new recruits to the cult of the motor car are to be sought by the arousal of their interest in used cars. Motordom needs new recruits constantly, no less than the army of national defense needs recruits. In the stand taken by this magazine on behalf of the motor car owner, dealer and manufacturer, special attention is given in this issue to the possibilities of greatly enlarging the ranks of motordom by "Giving the Used Car a Chance." The utilities of motoring, likewise the delights of motoring belong to no one set of individuals. Motordom is an exceedingly democratic land and there is not only room for many more inhabitants, but a welcome for them and enjoyments for all.

MORE insight into the mechanical assembly of motor vehicles is afforded the new motorist, or the experienced motorist, in a very informative article on the "Restoration of the Chevrolet Car." Motorists who are wisely bent on knowing their car thoroughly, and those who realize the exceptional benefits secured by "working on the car" themselves will find text and illustrations of the operations exceedingly valuable.

THE National Automobile Association presents many advantages to its large and growing membership. Its services to motorists are well known and that they are widely appreciated is attested by the fact that it is today one of the leading and most influential motoring organizations in the country. The association journal in this issue, besides its usual information pages, contains also a review of four years' work of National Highways Association.

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AUGUST 10, 1917.

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Treasurer . . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

Published the 10th and
25th of each month by the

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COMMON sense counsel is contained in a circular letter issued by the National Automobile Chamber of Commerce to members urging concerted action in the industry to offset the injurious influence of many alarmist stories appearing from time to time in the daily press. Cooperating with the manufacturers, the periodical press and the National Automobile Chamber of Commerce, there is every reason to allay panicky feeling and substitute certainty for uncertainty in the success and continuance of business during the war. This is midsummer; the silly season, to a certain extent, and the ground work for winning the war must be established by legislation in Washington, by decisive programmes on war revenue taxation, control of food and of railway transportation, steel supplies and exports, and it is about these highly important measures that the silliest canards are the surest to be woven. The chamber's admonition to save, not waste gasoline, is entirely proper, reasonable and right. It would be wisdom, war or no war. To arouse the people to a full realization of the task of war ahead, it is hopeful that it will not require disaster to accomplish the end sought. "Honking" may be easily overdone.

THE topic in the idea exchange this time, another one dealing with tires, brings up the question of how much they are damaged by running in the car tracks. In this connection a line to the editor from the writer of the winning letter on the previous tires question points the way to one who might ask, "How is it done?" He says: "I value your journal above all others, and I have had several; and upon seeing this subject, about which I felt I had had considerable experience, I wrote accordingly." The tire and track question appears exceedingly promising.

The AUTOMOBILE JOURNAL

VOL. LXIV.

August 10, 1917

No. 1

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Giving the Used Cars a Chance In Motordom

Climbing the Hills of Prejudice, Overcoming Set Price Obstructions and Making Steady Headway to a Fair Market They Advance In a Great Campaign for Satisfied Autoists

MOTORDOM cannot allow the used car problem to be slurred over. Too much importance cannot be attached to used car values. The owners', manufacturers' and dealers' interests are too vital to allow depreciation to be fixed by publications or anybody whose sole aim is the deflation of actual values.

The Automobile Journal maintains that the values placed in a car by a manufacturer shall be maintained; that added values given a car through hundreds of dollars spent upon it in new equipment and replacements, shall not be wiped out by a business crime, the attempted establishment of set prices on used models, an effort which is foredoomed to failure.

There is no good reason to sacrifice all the cars in the land to the greed of any individual or body, or the misfortune of a few motorists who may be forced by some unfortunate, personal reason, to dispose of their motor vehicles.

We maintain that a car shall be appraised for its actual service and worth; that when it is resold it shall be made fit and give its owner full satisfaction and make him or her a confirmed motorist. This is the unshakable and correct viewpoint and the reasons for it are the reasons which actuate the Automobile Journal. These are, viz:

1. To stimulate business.
2. To benefit the manufacturer.
3. To protect the owner.
4. To make a real business for all dealers.

These aims are accomplished by spreading the facts of true motor car worth. As this is done, inevitably more used cars will be sold, more new cars will be sold, more of everything that goes with them will be in demand, and every interest in human life and affairs linked with automobiles will know more activity and have more prosperity.

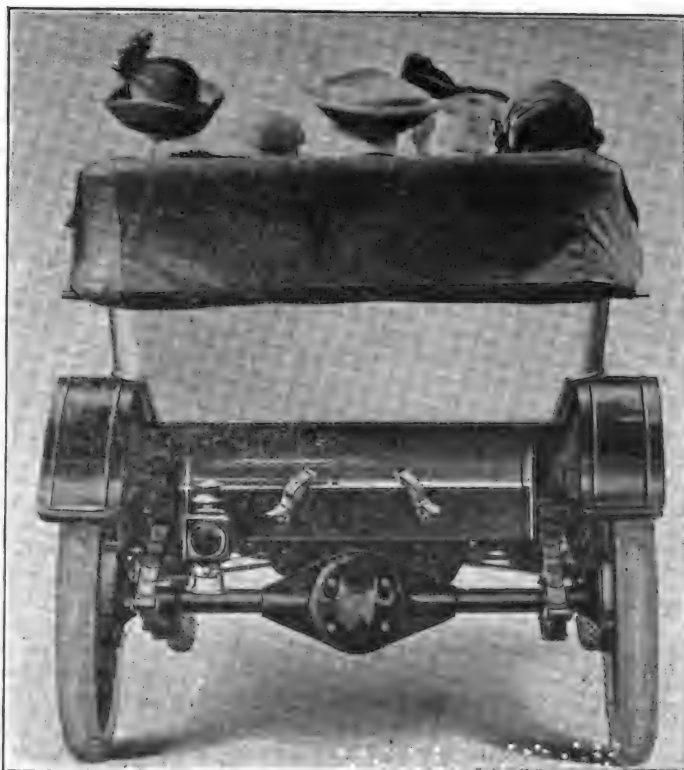
OWNER HAS A RIGHT TO EXPECT FAIR MARKET VALUES

The owner of a car who is either desirous of getting a new car, or importing to do so, is entitled to receive a fair market value for his present property. In case he decides to make a change, however, he is confronted by not a few obstacles, which, when spoken of in bulk, are usually called the Used Car Problem. The present method of dealing with used cars is found to be unsound in many particulars as to merchandising principles, the chief one being an advance condemnation price rated on the year of the car's make. It has been found to result in unfair discrimination,

dissatisfaction and poor service to both the purchaser of the new car and the purchaser of the used car.

It can be readily seen that the ideal method of handling the amount of depreciation would be to base it on the service received from the car, subject to such slight variations as the general conditions of the car would warrant. On such an allowance plan the owner is assured of obtaining the proper amount for the used car.

In handling the turnover of the transaction the dealer has the guidance of his experience and a selection of methods which apply particularly to his territory and clientele, most



When Full Satisfaction Is Obtained for the Family the Used Car Owner Becomes a Confirmed Motorist.

especially with reference to the pulling power of his personal advertising and the length of his used car prospect list. The purely commercial side of turning over the used car, as has been shown in previous articles in this journal, is solvable when approached by those who have joint interest in its solution, namely, the manufacturer, dealer and owner.

Cultivation of Motorists' Interests.

It is found, in the present stage of the trade, that more attention must be paid to the matter of giving the used car a chance. Five years ago the car which had seen a service of six months to two years, had to bear more of a load of the prejudice which attaches to age than the highly standardized models of the present period. Changing models, changing lines, soon make the car of a few years back so extremely obsolete in appearance that the ordinary citizen would not relish being seen in it by his neighbors. The first prejudice to be overcome in giving the used car a chance, therefore, in a resale proposition, is objection to its outward aspect. This calls for outlays, of course. The surprising fact, however, is not so much that an outlay is necessitated, but that a most astonishing improvement can be secured by moderate outlay. In case the used car is entirely modern in body lines, new paint alone makes it entirely presentable to the road. General motor excellence in the casual run of cars simplifies the matter of alterations remarkably. It is, of course, true that the vital parts of a car admit of alterations. Attention to the internal parts is the most highly important in the regard of service in its last analysis. Of this important feature of used car alteration and restorations recent special articles



If It Has a Top Like This—Give It a 1917 Top Like This.

in this magazine and others to come treat exhaustively.

The solid element of the automobile industry is sincerely convinced that through strict honesty and the utmost frankness only can there be a gradual winning over of the public confidence, and the used car business be placed on a sound foundation. Misrepresentations and ignorance of car values are less prevalent than they formerly were, yet it takes time to remove the taint of unfair practices in so wide a field as that covered in the general sales of motor cars.

Overcoming Second Sale Prejudices.

The second hand or "slightly used" car comes into the motor car market in so many ways as to almost defy explanation. The assumption that no car is thus thrown upon the market unless "something is the matter with it," is another inborn prejudice met in the used car market that is simply a relic of the old horse trading days. If this view is suffered to exist but temporarily there is this at least to be said in favor of the machine which could not be put forward in the case of the animal. A mechanical overhauling will restore a worn or abused car to service, while an ill-used horse is not so liable to regain its powers, even though wisely treated by an excellent veterinary. Besides, it is an utter impossibility to put a new body on a horse, although something might be done in the way of harness fittings, which would roughly correspond to a new top or a new hood.

Many motorists have found that a used car of high initial quality is an excellent purchase at a price equal to the market of a new one of the lesser grades. This fact is valuable to the middleman, who by careful inspection and replacement

of parts can literally guarantee his used cars. The assurance of a positive investment goes a long way with the consumer who knows that he is buying service in a car, not simply a name and outward appearance. Many more motorists, when they understand that the used car is being given a real chance, may come to prefer a used car of high primary value to a new one of lesser durability.

It all depends on the arousing of interest in genuine values and the preservation of that interest after it has been aroused. The chief requirement resting on the dealer is to win the confidence of the buyer. Selling a car at advertised prices is not the same problem at all as that of buying a used car from a prospective patron for a new car.

Methods of Arousing Interest.

The enlargement of a market for vehicles of the used car class is a large and sincere question confronting the dual selling combination of manufacturer and dealer jointly.

On the one hand much has been accomplished in the way of establishing sincere values in used cars by the holding of large exhibits. Pains-taking attention given to massed displays of this character assures the buying public that the real values in used cars are recognized in high trade circles. They aroused interest and were a decided forward step in the campaign literally forced upon the industry to show the actual merits of used cars. In proof of this it is only necessary to recall that at the Used Car Show in Chicago in May 216 cars were sold on the Coliseum floor, in a total attendance of 25,000 persons, for \$170,161, an average price of \$787.75; while the same week in salesrooms in the city saw 153 cars sold at an average price of \$556.48.

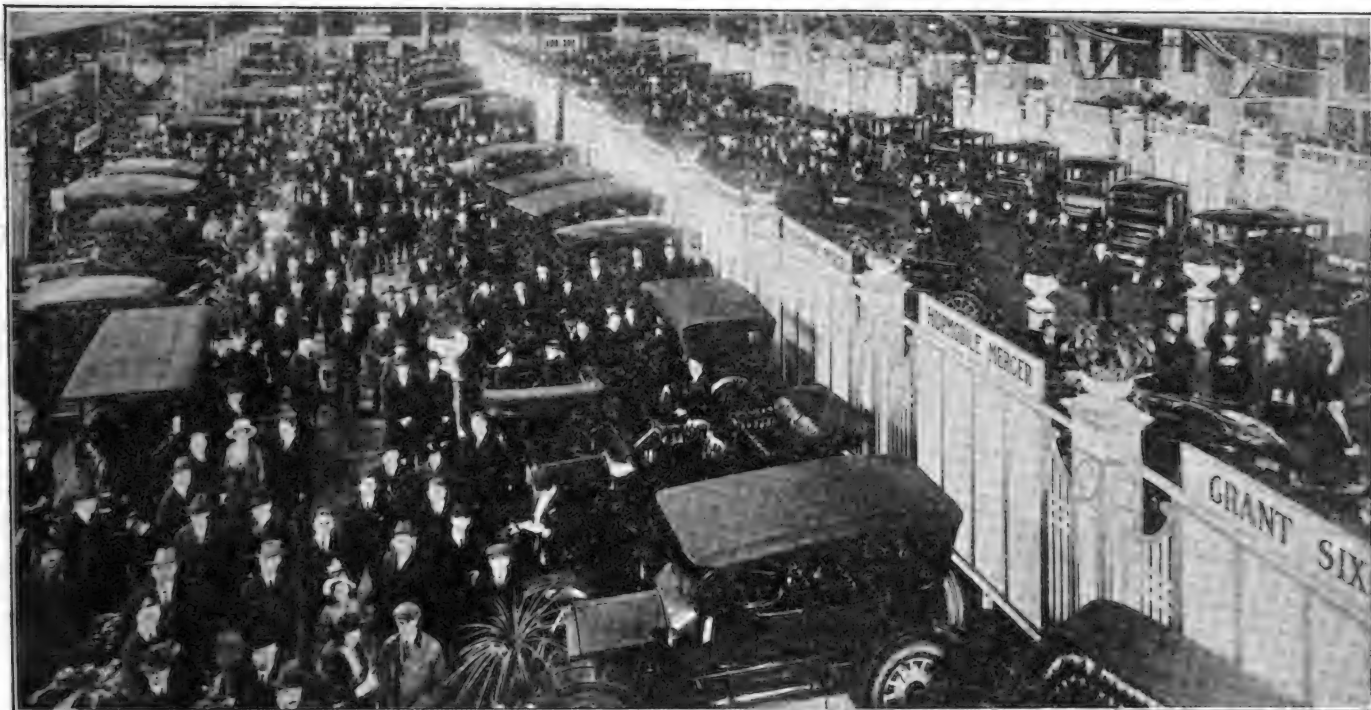
On the more distinctly retailing side of the business the plan of having an annual sale of used cars has met with a certain amount of success. While it has the merit of bringing together prospective buyers and arousing interest, as in the case of new cars, however, such a display is only one feature of a selling campaign which cannot take the place of sustained, all-year-round offerings of value and service to the discerning, buying, consuming motorist.

In large, compact or central communities, another plan that is meeting with growing success is the co-operative clearing house serving that single district.

To buyers this specialized and thoroughly efficient central used car mart can be made to inspire the confidence of obtaining cars "exactly as represented" at a fair price. It is demonstrated every day that there are thousands of people who never have owned an automobile, who will buy used cars if they can only be convinced that their ignorance of motor car conditions and value is not going to place them in danger of being tricked. It is equally true, also, that there are comparatively large numbers of experienced motorists who are willing to give the used car a chance under fair representations and with a prospect in service that will mean money saved to them. In this class are to be found persons who are temporarily not car owners, as well as those in need of an extra car.

MILLIONS MAY BECOME MOTORISTS BY THE USED CAR ROUTE

It is held by competent appraisers that unless the car is quite old and is sold at a very low price there is no good reason why the buyer of a used car should not obtain the same guarantee which is given with a new car. A guarantee is the contract under which the modern business man buys and sells his highly valued commodities, and refusal of it is a natural stumbling block to barter. Unscrupulous bargainers often make use of the form and by furnishing a worthless guarantee accomplish a sale by trickery that their goods would not obtain on merit. In this respect, however, the purchase of a motor car is no different from the purchase of a suit of clothes. Ordinary caution and circumspection must attend a transaction over the counter anywhere.



An Unusual View of the Recent Used Car Exhibit in the Coliseum at Chicago Showing Re-embellished Cars in Places of Honor and the Interest Aroused in Them by the Great Crowd of Visitors and Buyers.

It has been shown that motor car demand has undergone no diminution of volume, but a certain change in character. The car owner has a double role, one as a factor in the production of used cars and another in giving them their chance. This dual element of interest recognizes that so long as the full worth of a car is far from exhausted under its first owner the extraction of the balance calls for fair treatment in the house of its friends.

Delights in a Used Car.

The statisticians have developed that there are still millions of prospective purchasers of motor cars, but have not been able to supply the missing reason just why these men of means have not embarked on the sea of motordom.

Perhaps this reason or explanation is found in the experience of the average motor car dealer, who will recite numerous names of persons who have called in, looked over the cars, had demonstrations and then walked out again without placing their name on the dotted line. These same individuals repeat this performance year after year and to all outward appearances are absolutely sincere in their intentions, but for some unknown reason can never bring themselves to the point of buying.

There looms up in the average mind many things that cause one to hesitate in taking up motoring, the question of expense, depreciation on investment and possibilities of accident. These bugaboos of course array themselves in the mind before the person has had the opportunities to experience the many conveniences and pleasures that come with the ownership of a motor car.

Such persons are not looked upon as good prospects for new cars, but to the live dealers with a strain of psychology in handling their business there should be little difficulty in inducing these hesitating prospects to enter motordom via the route of the used car. Every dealer practically has one or more used cars on his hands to dispose of and their marketing should be easiest among a class of such prospects, as his arguments are along a line that combat practically every objection of those who are holding off for the reasons enumerated.

In the first place the purchaser does not stand any great depre-

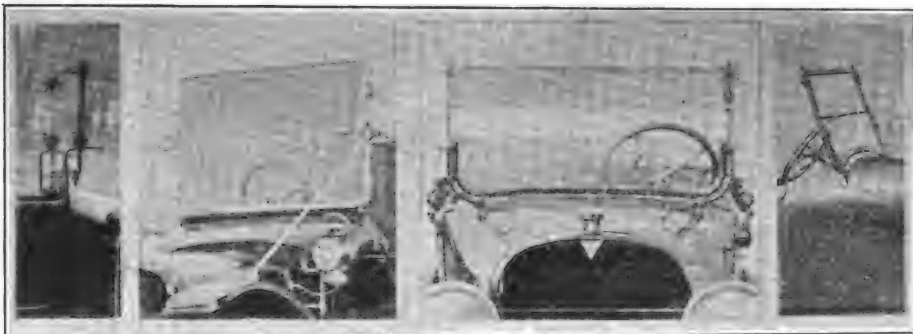
ciation and if he shows judgment he gets a car, that at the figure paid, is far better than most new models he could have secured at the same price. With the lower first cost, no material depreciation, lower insurance rate and the fact that the wear and tear on the car becomes less noticeable if it has been used to some extent, are all factors to encourage the novice in starting as a motorist.

The essential features about a motor car include those mechanical functions that cause it to run as long as gasoline, oil and water are supplied. Decorations, appointments and extra equipment are a matter of personal taste and pride. Of course, in some of the professional callings or in certain lines of business there is considerable value vested in the appearance of a car, but for the man who is entering the sport for pleasure and does not feel warranted in making a large outlay, strict attention to the looks of a machine is not the rule.

The Making of a Solid Customer.

Assuming that the influence of these factors has resulted in the sale of a previously used car to a person who is engaging in his initial motoring experience, in nine cases out of 10 it will be found that the purchaser has not only received satisfaction from his purchase, but that he will ultimately become a prospect for either another second sale car or a new one. This is only a natural conclusion, as he finds that he cannot only get about his business with great facility, seeing more people in less time, accomplishing more and placing himself in a new atmosphere, but has also established a new

(Continued on Page 47.)



The Older Styles of Windshields May Stand Replacement by One of the Sloping Models on the Right.

QUOTATIONS OF UNCONTROLLED USED CAR MARKET

In the Sales Columns for Automobiles Far and Wide the Owner Voices Continuous Protest Against Many Deflated Values

In the attached list of advertisements taken from different New York and New England newspapers, one finds a fairly accurate table of second hand car values as established in the open market. Where possible the advertisements have been selected to show the range of offering prices on the same model, giving the highest and lowest price, and in other instances just a single advertisement on one make and model is used. Different styles in one yearly model are also submitted where the advertisements are available.

While as previously stated in this journal, prices are largely contingent upon condition of a car, as a means of ready reference to determine market values ap-

proximately, this compilation of advertisements gives as near the actual market value as anything printed and establishes a maximum price which is actual. Just how much less a car could be secured for, below the prices quoted, of course would depend upon conditions governing each individual case. Where private parties are making the offerings it is often possible to secure a material reduction from the offered price, as in most cases these individuals had rather make some sacrifice to get the car off their hands. With used car dealers, however, the price advertised is usually about the bottom, although it may be said that in fixing their prices these dealers seldom resort to the trick of placing

an artificially high price on their stock so as to enable them to lower it when a prospect is inclined to seek discounts. In fact, the used car dealer, as will be found by examining the various advertisements, tries to set his price as near the actual market as possible, keeping in mind, however, his overhead, repair expense and a fair profit.

In many cases the wide variance in prices on the same make and model are largely due to the difference in the condition of the tires, as four good tires are worth on the average over \$100, while an outlay of that much will soon be necessary on a car equipped with shoes and tubes that have overrun their guarantee.

AUTOMOBILES

1917 BUICK TOURING, \$775.

Little Six model, has wire wheels and is in finest mechanical condition; all good shoes and original paint is excellent; powerful, quiet running and easy riding.

\$750—1917 BUICK SMALL SIX. Touring; in perfect condition.

1916 BUICK, \$700.

Touring car, run 3800 miles, little six model, just been thoroughly overhauled and looks and runs like a new car, equipped with all new tires, spare rim and tire, light and inexpensive to operate.

1916 BUICK TOURING; model D-55; 7-passenger; in fine condition; \$1000.

1916 BUICK SMALL SIX TOURING. In excellent condition; has had the best of care; tires and paint good.

\$335—1915 BUICK ROADSTER.

Model 25; in perfect condition and fully equipped; this is a light car and very economical to run.

1915 BUICK ROADSTER, \$475.

Model C 36; in extra fine condition; newly painted and recently overhauled; all fine shoes and extra; call at once for thorough demonstration of this popular runabout.

1917 CADILLAC TOURING, \$1700.

Run less than 2500 miles by present owner, who must dispose of it at once; owner can be referred to as to condition throughout; guaranteed fully and thoroughly demonstrated.

CADILLAC 1916; 7-passenger touring car; perfect condition; only used four months; \$1600.

\$750—1915 CADILLAC.

7-passenger touring; in good mechanical condition and one spare tire.

1916 CADILLAC, 7-PAS. TOURING, \$1250.

An exceptionally attractive car that has been exceedingly well kept; paint, varnish, upholstery and tires are almost like new; car has had very little mileage and is splendidly equipped and the price at which it is offered is exceptionally low for so good a car; "money back guarantee."

\$700—1916 CHALMERS.

7-passenger touring; in very good condition, with complete equipment.

AUTOMOBILES

1916 CHALMERS TOURING, \$600.

Almost brand new and must positively be seen to be appreciated; original paint is perfect and all shoes are like new; an exceptional trade for some one; don't miss it.

1916 CHALMERS 6-40, \$525.

7-passenger touring; has been revarnished and is in good running condition.

\$600—1915 CHALMERS.

Coupelet; a fine 3-passenger car with complete equipment.

1917 CHANDLER TOURING CAR \$950.

Driven very carefully but 6000 miles by a lady; all new tires and in fine condition; traded for a Willys-Knight.

1917 CHANDLER, 7-PASSENGER, \$775.

CHEVROLET, 1917 touring; model Baby Grand; car has been driven only 2500 miles; price \$600.

1916 CHEVROLET TOURING, \$400.

5-passenger; electric lights and starter, demountable rim and many extras; choice of two; one at \$375.

1916 5-passenger CHEVROLET; many extras; \$385.

1915 CHEVROLET, \$325.

Roadster, with electric lights and extra shoe; always been driven by original owner, who has just traded for touring car; has been newly varnished and looks like new.

1915 CHEVROLET "Light Six" touring; \$350.

DODGE 1917 TOURING CAR, \$675.

Used 2600 miles; has every possible equipment and is like new; one extra shoe mounted; has the high hood and the long wheelbase; open to mechanical inspection and demonstration day, evening or Sunday.

DODGE BROTHERS TOURING CARS.

1916 production; choice of a limited number from \$500 to \$615.

DODGE BROTHERS TOURING, \$450.

1915 production; present owner will sell this week only.

DODGE BROTHERS ROADSTER, \$550.

1916 production; has low mileage; been well taken care of.

AUTOMOBILES

\$550—DODGE 1916 TOURING CAR.

Good condition; owner will demonstrate.

\$375—1917 FORD TOURING CAR.

Been used very little and is in the finest possible condition and is fully equipped; has over sized tires and guaranteed.

FOR SALE—1917 Ford touring car; perfect order; sell for \$325 or best offer; can be seen at Liberty Garage after Sunday.

1917 FORD TOWN CAR, \$465.

Used privately about 900 miles; fully equipped; many extras, shock absorbers, same size tires all round, nobby tread; easy terms.

\$450—1917 FORD TOWN CAR.

With demountable rims; extra tire and rim and many extras.

1917 FORD COUPELET, \$465.

Used 1100 miles and just like new; fully equipped; many extras; call for demonstration.

1917 FORD COUPELET, \$425.

\$285—1916 FORD TOURING CAR.

In excellent condition; has Firestone demountable rims; extra tire and rim and many extras; paint and tires perfect.

1916 FORD, \$265.

Touring car; fully equipped; many extras, shock absorbers, Crown fenders, demountable rims, same size tires all round, bumper on front of car, has had very little mileage and is in fine condition.

1916 FORD TOWN CAR, \$365.

Has been used three months privately and is in the finest possible condition; same size tires all round; 4 new tires; cost new with extras \$795; bargain.

1916 FORD COUPELET, \$385.

1915 FORD TOURING, \$250.

To \$300; seven to choose from; some with electric lights, extra shoes, slip covers; some with new 1916 bodies.

1915 FORD, \$225.

Roadster; fully equipped; many extras; oversize tires, special 1917 hood; has been used carefully; fine condition; like new; bargain.

\$275—1915 FORD TOWN CAR.
In perfect condition.

\$365—1917 FORD TOWN CAR.
With demountable rims, extra rim, side curtains for driver's seat.

1916 FRANKLIN TOURING, \$1350.
Finest possible condition; only run few thousand miles and positively cannot be told from new; all tires practically new and paint perfect; guaranteed fully.

1916 FRANKLIN TOURING, \$1175.

1917 HUDSON SUPER-SIX SEDAN.
Here is a car that we feel safe in saying cannot be distinguished from one that has never been used; painted a dark blue, with black hood and trimmings; there is ample room for seven passengers to be seated comfortably and the excellent riding qualities are worthy of special comment; the gray whipcord upholstery appears neither soiled nor worn and the whole car presents a very smart effect; tires are in very good condition—all non-skids—size 35x4½; may we arrange a demonstration to suit your convenience? This car may become your property at \$1900.

HUDSON 1916 touring; in excellent shape; newly painted; tires new; \$750; can be seen at garage.

1916 HUDSON, \$700.

Yacht line body; newly painted; oversize tires; a light, economical 5 or 7-passenger car; small mileage.

\$550—1915 HUDSON 6-40.

Seven-passenger touring car; in A1 condition and is fully equipped.

\$900—1917 HUPMOBILE TOURING.
In excellent condition.

1917 HUPMOBILE TOURING, \$950.
Very latest model; only run few hundred miles and is guaranteed like a new car; don't miss this excellent trade in a fine, light family touring car.

1916 HUPMOBILE LIMOUSINE.
Owned by private family who have a number of cars and have no further use for this one; almost new, as it has been used very little; call for exceptional bargain.

1916 JACKSON EIGHT, \$750.
This is an especially comfortable, roomy 7-passenger touring car, with special upholstery; all good tires; lots of extras; "money back guarantee."

1917 MAXWELL ROADSTER, \$475.
Run less than 1500 miles by young lady, who has no further use for a car; a fine, light runabout, inexpensive to operate and easy riding; full guarantee and thorough demonstration.

MAXWELL 1917 runabout; new condition; price \$425; subject to reasonable offer.

1916 MAXWELL TOURING, \$400.
4-cyl.; finish like new; low mileage; excellent mechanical condition; electric lights and starter.

1916 MAXWELL TOURING, \$350.
This fine light car has been used very little and is in excellent condition throughout; all good shoes and original paint is in good condition; guaranteed.

1916 MAXWELL, \$375.
Roadster, with self-starter, electric lights, in the finest possible condition; tires and paint new; demountable rims, one extra; shock absorbers; call for demonstration.

MAXWELL roadster, 1916; new tires, newly painted and overhauled; guarantee as to condition; \$450.

FOR SALE—1915 Maxwell touring; perfect condition; starter and lights; \$350.

1916 METZ TOURING, \$350.
Electric lights and starter; had very low mileage; used entirely by private family; very economical to run.

1917 METZ touring car; used only 60 days; run less than 800 miles; reason for selling, financial difficulties; I will sacrifice this car for \$550; looks like new.

1917 METZ, \$355.

Touring car with self-starter, electric lights, original tires and paint and cannot be told from new; fully equipped with extras; one spare tire and rim; fully guaranteed; call for demonstration.

1916 METZ ROADSTER \$215.

Lights and self-starter; dandy car; all in nice condition.

METZ runabout; overhauled factory, late 1916, self-starter, electric lights, demountable rims, two spare, \$350; must sell; owner going abroad.

1915 METZ speedster, perfect condition, overhauled, 4 new shoes, will sacrifice for \$130.

\$1250—LATE 1915 OR EARLY 1916
Mercer roadster in the finest possible condition; tires and paint like new.

1916 MITCHELL, \$700.

A well built, beautiful 5-passenger touring car that has been carefully taken care of and always driven by one person; "money back guarantee."

1916 MITCHELL 6, 7-PASSENGER, \$600.
With four almost new tires.

1916 NATIONAL TOURING, \$750.

Newport model; cost \$2500 and is in finest possible condition throughout; powerful, perfect riding and quiet running; call for thorough demonstration.

FOR SALE—Overland, 5-passenger, 4-cyl. car, 1917 model; electric lights and starter; terms; price \$600; 2 new non-skid tires on back; 1 new Goodyear front.

\$400—1917 OVERLAND TOURING.
Model 75, been used very little and is absolutely like new and is fully equipped.

1916 OVERLAND, \$395.

Model 83, 5-passenger, very economical, newly painted, small tires and looks and runs like new; self-starter, electric lights; all in fine mechanical condition; just the car for small family; call early; must be sold this week.

MODEL 83 1916 OVERLAND, \$375.
Touring car; used 2900 miles; was delivered Sept. 20; equipped with self-starter, electric lights; has been used privately and is in extra fine condition; like new.

1916 OVERLAND RUNABOUT, \$450.
Electric lights and starter; extra tire.

OVERLAND runabout; 1916; \$325; extra new shoe and tubes; electric starting and lighting; elegantly equipped; 30 days' trial allowed.

1915 OVERLAND, \$425.

Model 80 roadsters, 2 to choose from; one equipped with 4 brand new Kelly Springfield tires; overhauled and revarnished; this was the best model made by the Overland Co.; cost new \$1125; three months' guarantee.

\$385—1915 MODEL 80 OVERLAND.

Touring car; in good condition and is fully equipped.

1917 OAKLAND TOURING, \$675.
Light six; almost new and will be thoroughly demonstrated to intending purchaser; inexpensive to operate and very powerful; guaranteed fully.

1917 OLDSMOBILE touring; used a little for demonstrating; \$1200 for quick sale; list price \$1542; 1916 8-cyl. Olds. looks and runs as good as new; \$775; Ford touring, late model, \$220.

1916 OLDSMOBILE "8," \$700.

5-passenger, light and inexpensive to operate; very easy riding; paint new; tires practically new; natural wood wheels; very good looking car; guaranteed thoroughly; ride in this car and you'll satisfy yourself as to its power and comfort.

1916 OLDSMOBILE "4," \$590.

5-passenger; will do 18 to 20 miles on a gallon of gas; car looks as good as new; fully guaranteed; just the car for small family; very easy riding and condition is perfect; call early for ride.

1916 OLDSMOBILE "4" ROADSTERS.

Several to select from; equipped with extra folding seat in rear and up-to-date in every respect; these cars were listed at \$800; price now is \$550 and \$650.

AN OLDSMOBILE CABRIOLET.

1916 four; model 43 serial; three-passenger; ideal for lady or physician; \$750.

1917 PAIGE TOURING, \$1025.

Stratford model; cost \$1700 and is absolutely perfect mechanically; original paint not scratched and 4 nearly new Firestone tires; easy riding and very powerful; call and ride.

1916 PAIGE "6-46."

5 or 7-passenger touring; overhauled, repainted new tires, Continental motor, Gray & Davis starting and lighting system; \$900.

1916 PAIGE FAIRFIELD SIX.

A classy car; plenty of room; 7-passenger; make a good jitney; our price now \$690.

\$1500—1916 PEERLESS.

8-cy. touring; just out of paint shop; full equipment, including new extra shoe and tube; sold with our used car guarantee.

1915 PULLMAN 7-PASSENGER \$400.

Motor in fine condition; just out of paint shop; wire wheels.

1916 SAXON ROADSTER, \$550.

In beautiful condition; tires and paint like new; just the car for a man that wants a light six.

1916 SAXON TOURING CAR, \$550.

Tires, paint and motor in excellent condition.

1915 SAXON ROADSTER, \$250.

Hand horn, speedometer, Atwater Kent system; tires like new.

STEARNS-KNIGHT 1916 LITTLE 4.
price \$700; reasonable offer considered.

SERIES 17 STUDEBAKER, 6-CYL., \$775.
Combination 5 and 7-passenger touring car; light weight, economical, high powered and flexible; renewed, repainted and guaranteed.

1917 STUDEBAKER, 6-CYL., \$725.
7-passenger touring; there are two of these cars to select from.

1917 STUDEBAKER, MODEL 35, \$550.
7-passenger; original paint; 4 good tires.

SERIES 17 STUDEBAKER, 4-CYL., \$625.
Combination 5 and 7-passenger touring car or 3-passenger roadster; renewed, repainted and guaranteed.

1916 STUDEBAKER, \$475.
4-cyl., 5-passenger touring car; self-starter, electric lights; has been used 3 months and was traded in for closed car; fully equipped.

1915 STUDEBAKER, 4-CYL., \$475.
3-passenger roadster; very economical; 18 to 20 miles on a gallon of gasoline; rebuilt, repainted and guaranteed.

1915 STUDEBAKER ROADSTER, \$350.
A 3-passenger runabout; recently repainted; good tires.

RESTORATION SURVEY OF THE CHEVROLET

Including Instructions on Repairs and Replacements That May Be Necessary Upon the Engine, Gearset and Rear Axle

This is the third of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The fourth article of this series, which will appear in the Aug. 25th issue of the Automobile Journal, will be devoted to the Overland car.

THE Chevrolet 490 chassis is practically unchanged since its initial construction. Nearly all repairs that may be necessary upon the engine, gearset or rear axle may be made without work on the other units.

The engine is of the valve in head type, and, with the head removed it is an easy matter to clean out the carbon and grind the valves without any danger of dropping grinding compound into the cylinders. Whether the work is a complete overhaul or partial restoration the general instructions are the same. The removal of the clutch or gearset without removing either the engine or rear axle is taken up at the latter part of this article.

Where extensive work is to be done upon an engine work is greatly facilitated by the removal of the radiator. The radiator of the Chevrolet car is fastened to the frame cross member beneath it by two bolts, and having drained the water these bolts should be removed, as should the brace which extends from the radiator to the dash board. The water connections should next be unfastened at the engine, either by removing the hose clamps, or by taking out the cap screws which fasten the iron inlet and outlet to the engine. In the latter case the fan belt must be removed, then the radiator can be lifted from the car.

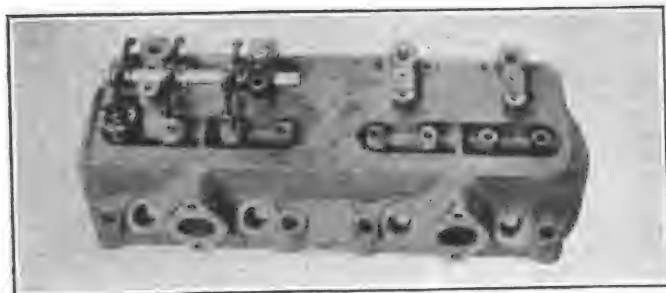
The gasoline should now be turned off at the tank and the gasoline tube disconnected from the carburetor. The throttle and carburetor control rods should next be unfastened, as should all of the secondary wires at the spark plugs. Four cap screws fasten the intake manifold to the cylinder head. Take these out and remove the manifold from the engine.

Removing Exhaust Fitting.

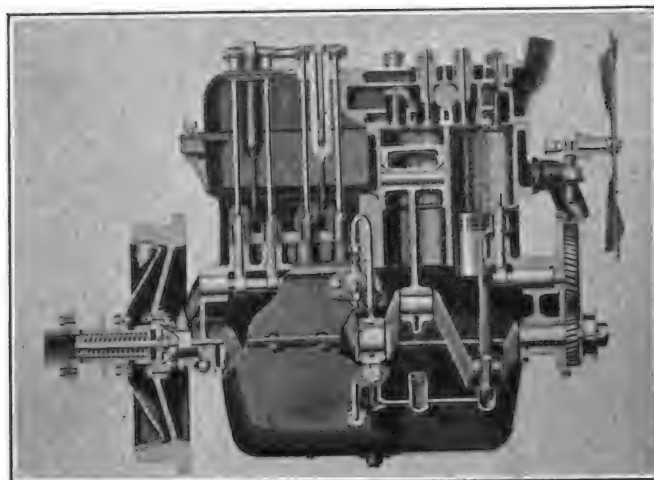
The exhaust fitting, located at the back of the cylinder head, is fastened to the head by two cap screws. This is next removed, leaving the cylinder head free of all connections.

The cylinder head is fastened to the block by four long and four short cap screws. When these are removed the head may be lifted from the cylinder, leaving the push rods on the cylinder block.

Before taking off the push rods each should be marked with a tag showing its location. After the cylinder head has been removed the carbon may be scraped from the pistons and the explosion chamber. The rocker arms are in two sets of four each, mounted on the rocker arm shafts, and are held in place on the shaft by washers and cotter pins. Very little play in the rocker arm bearings results in noise and there-



Cylinder Head with One Rocker Arm Assembly and Valve Assembly in Place.



Cross Sectional View of Engine, Showing All Important Working Parts.

fore the arms showing wear should be rebushed. The rocker arm shafts are each held in place by two caps, which are fastened by studs and nuts. The nuts may be removed and the rocker arm assembly lifted from the block.

With the rocker arm assembly removed the cylinder head is placed with the lower part upon a board or table, resting upon the valves. The valve springs may be compressed by pressing down upon the spring washer with a screw driver on one side and the thumb or finger on the other, and when compressed held down by the screw driver, the key through the end of the valve stem can be taken out. The spring may then be removed, releasing the valve, which may be withdrawn through the bottom of the head when the head is lifted from the board.

About Grinding the Valves.

Before removing the valves from the block each should be marked so that it may be replaced. The valve grinding operation is similar to that for grinding Ford valves, which was described in the last article. In grinding the Chevrolet valves, instead of a special tool, a screw driver may be used, as there is a slot in the valve head.

In any case, where valves are ground, but very slight pressure is required. Where much pressure is applied the surface of both the valve and its seat is apt to be grooved, and frequently the valve left in a worse condition than when the work was begun. But little compound is necessary and the valve should never be given a complete turn, the grinding being by reciprocal motions.

After the valves have been ground into place they, as well as the cylinder head and valve ports, should be cleaned very carefully with kerosene and a stiff brush to remove any particles of grinding compound.

Before assembling the parts on the cylinder head the exhaust passages, which are cast integral, as well as the water chambers, should be thoroughly cleaned.

The valves may now be put into their respective places and the head rested upon a flat surface, holding the valves into place. The springs and washers are placed in position and when the springs are compressed with a screw driver and a finger as directed above the key may be slipped into place. After the rocker arms have been assembled and fastened to the cylinder head the head may be put to one side until the engine is reassembled.

As directed in the Ford article the cylinder walls should be carefully examined and scratches filled or scores ground

out as the case may be.

In Lower Part of Engine.

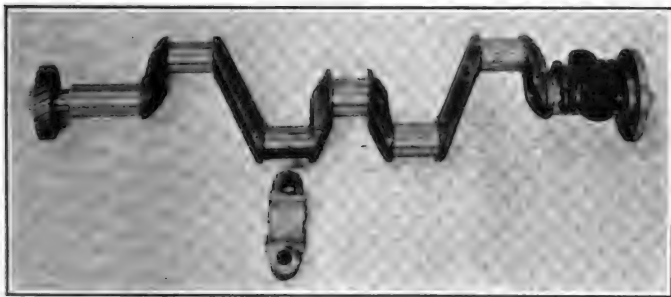
The engine pan should now be removed by unfastening the bolts which hold it to the frame, exposing the lower part of the engine. The oil in the crank case may be drained by removing the pipe plug in the bottom of the base, or left until the oil pan is removed. After the two pipes leading to the pump have been disconnected and the 14 bolts which hold the pan to the crank case removed, the pan may be taken from the engine, exposing the crankshaft, camshaft, the connecting rods and lower part of the pistons.

The oiling of the Chevrolet engine is by splash, the oil being pumped from the lower part of the base by a plunger pump and distributed through tubes to splash pans located beneath each connecting rod. The oiling system deserves the most careful attention and all of the distributing tubes should be carefully cleaned, first with a liberal flushing of kerosene, then with a flexible wire, and again with kerosene.

After the oil pan has been removed the pipe plug in the oil distributor body should be removed and the body cleaned. In case the car is equipped with a sight oil feed on the dash the piping should be carefully cleaned as above directed.

The connecting rods should be unfastened and the pistons removed through the top of the cylinders. Bearings for the connecting rods may be obtained and put into place without removing the pistons if desired, since the babbitt metal is not poured into the connecting rods as are those of the Ford car previously described.

The main bearings, which are a special construction, the babbitt being cast in bronze backs, can be replaced upon the removal of the caps of all three bearings and dropping the crankshaft down to permit their insertion. In doing this be



Crankshaft and Timer Gear Removed from Engine, Showing Main Bearing Cap Construction.

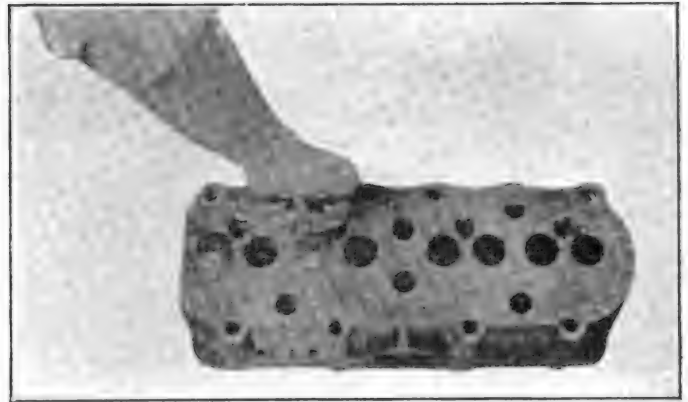
sure to support the flywheel with a box or jack so that the whole weight of the crankshaft, flywheel and clutch assembly is not supported by the repairer.

Scraping Babbitt Bearings.

When new babbitt bearings are put into place, either in the connecting rods, or the main bearings, it is customary to scrape them in so as to have the frictional surfaces as large as possible. To scrape a bearing properly takes a great deal of time, as well as patience, yet satisfactory results cannot be expected of a new bearing unless it is properly fitted, either by reaming or scraping.

To scrape in a connecting rod bearing the connecting rod is first removed from the crankshaft and a thin coating of Prussian blue smeared on to the crankshaft journal. The connecting rod and its cap are then put into place and the shaft or rod revolved one full turn. The connecting rod is then removed and the blue marking on the babbitt noted. High spots or pointed projections of the babbitt will be polished points, surrounded by blue rings. These high spots must first be scraped off with a sharp scraper made for the purpose, which may be obtained at any automobile supply house.

The color should next be wiped from the babbitt, the shaft coated again with blue as before, the connecting rod clamped into place, given one turn and removed. The distribution of color on the babbitt will be more even, and will indicate the higher portions which should be scraped off. The operation is repeated again and again until the transfer of the blue from the crank pin to the babbitt covers a great portion of the surface.



Valves May Be Ground with the Cylinder Head Resting on a Table, Using a Screw Driver for a Tool.

The great secret of doing a good scraping job is in removing but a little of the babbitt at a time, but in the right place. And unless the bearing is properly fitted it will continually cause trouble.

Scraping the main bearings is a similar work to scraping the connecting rods, except that the bearings only need be removed. The greatest care should be exercised in returning the babbitt pieces to the position in which they were scraped, each time that they are put into place.

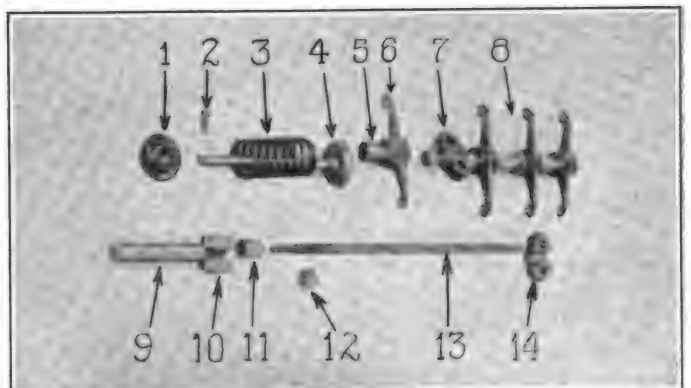
Lubricating Main Bearings.

Before the connecting rods or main bearings are put into place for the last time they should be thoroughly lubricated with a good grade of engine oil. If this is done a coating of oil is assured for the first few minutes run of the engine, as it would take that time for the oil to penetrate to all the bearing surfaces.

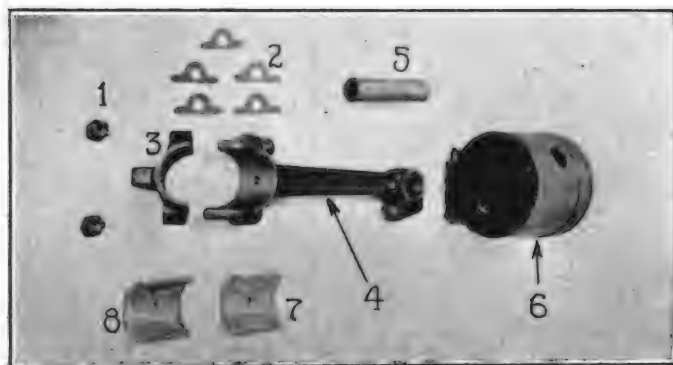
Every new bearing should be scraped into place with a certain number of shims between the cap and the base in order that future adjustments may be made the easier. When completed the bearing should clamp around the journal so that there is a slight amount of "stiffness" and absolutely no play. The cap should be clamped upon the shims rather than upon the journal.

Not only must the connecting rods be scraped in so as to form a wide bearing surface, but in scraping them into place they must be kept in line or "lined up." If all of the connecting rods are to be scraped into place the crankshaft should be removed from the engine block and placed between lathe centres or upon a flat surface with two crankpins resting upon V blocks.

The bearings must be scraped so that the piston will stand at right angles to the crankshaft centre line. If the crankshaft is between lathe centres the piston may be placed in an upright position and the distance between the lathe bed and one side of the piston compared with the distance be-



Valve and Push Rod Components: 1, Valve Spring Cap; 2, Stem Key; 3, Valve Spring; 4, Valve; 5, Rocker Arm Bushing; 6, Rocker Arm; 7, Rocker Arm Bracket Cap; 8, Rocker Arm Assembly; 9, Valve Lifter; 10, Valve Lifter Lock; 11, Valve Lifter Nut; 12, Valve Lifter Lock Nut; 13, Valve Lifter; 14, Rocker Arm Bracket Cap.



Piston and Connecting Rod Assembly: 1, Cap Retaining Nut; 2, Shims; 3, Connecting Rod Cap; 4, Connecting Rod; 5, Wristpin; 6, Piston; 7, Upper Babbitt Bearing; 8, Lower Babbitt Bearing.

tween the bed and a point on the opposite side of the piston. This may be done with a height gauge.

If the lathe is level (which may be determined by placing a carpenter's level on the lathe bed), a level may be placed on the piston parallel with the crankshaft centre line and the bearing scraped until the top of the piston is level.

When the crankshaft is placed on V blocks upon a flat surface the piston alignment may be tested by either the level method or by a height gauge.

The engine block may now be unfastened from the chassis by removing the two bolts at the front and the four bolts which fasten the rear section to the cradle like arrangement which supports the clutch and transmission gearset and surrounds the flywheel.

Moving Clutch Assembly.

The clutch assembly may be removed with the engine or separately. If it is removed with the engine the clutch release collar is unfastened from the pedal shaft, or the pedal shaft retaining bolts unfastened and the pedal shaft with clutch release lifted sufficiently to allow the removal of the clutch hub. When this is done the engine with clutch assembly may be slipped forward and removed from the car.

If the engine is to be removed, leaving the clutch in the car, the clutch release collar and pedal shaft bracket should be lifted as directed above, or removed and the flywheel revolved until the hole passing through the clutch hub is exposed. Then with a nail set, drift, or punch, the clutch spring retaining pin should be driven out. The engine, together with the clutch spring anchor stud, may then be removed from the chassis.

The clutch spring anchor stud is mounted so as to revolve on a ball bearing, the race of the bearing being clamped between the flywheel and the crankshaft flange. The stud is removed after the flywheel has been unbolted and drawn from the crankshaft.

If the clutch assembly has been removed with the engine

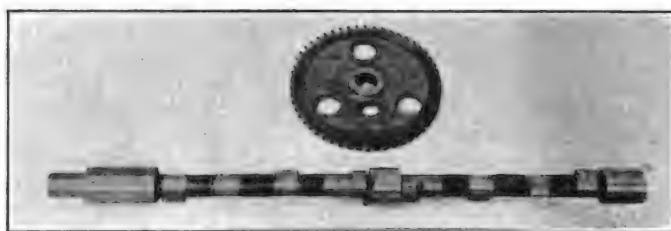
it may be removed from the engine flywheel by driving out the clutch spring retaining pin as directed above.

Removal of the Camshaft.

To remove the camshaft first unscrew the flat head cap screw holding the camshaft gear in place and then pull the gear from the shaft with a wheel puller. After the screw holding the camshaft thrust bushing to the engine block has been removed the camshaft may be drawn from the case.

There is very little liability of wear in the camshaft bearings and no provision is made for replacement, since the camshaft rotates in the engine casting, which is not bushed. Should there be noticeable wear a Chevrolet dealer should be corresponded with and means of restoration or replacement decided upon.

Since the smoothness of running and the positiveness of the drive is dependent upon the clutch, it deserves careful attention. If the clutch leather is burned in spots, frayed, broken or badly worn, it should be replaced. The leather may be chiseled away and the rivets cut and removed and a new facing obtained from a supply house put into place. The tension on the clutch facing expanders must be released before the facing is riveted into place or the clutch facing



Camshaft and Large Timing Gear, Showing Large Camshaft Journals.

will not fit properly. In putting the facing on the drum be careful to drive the rivet heads below the surface or engagement will be harsh and not at all dependable.

Handling Clutch Spring Assembly.

It will not be necessary to remove the clutch spring or the anchor stud unless the spring is weak or the thrust bearing is worn. If one desires to remove the clutch spring assembly the whole assembly of clutch drum and clutch hub is placed upon a box or board that has a hole in it of sufficient size to allow the clutch spring anchor stud to pass through. When the clutch drum is so placed that the anchor stud is over the hole, the anchor stud may be pressed downward with a block of wood or metal inserted through the square hole in the clutch hub drive ring.

The clutch spring retaining pin may then be withdrawn through the hole in the groove where the clutch release collar is fitted.

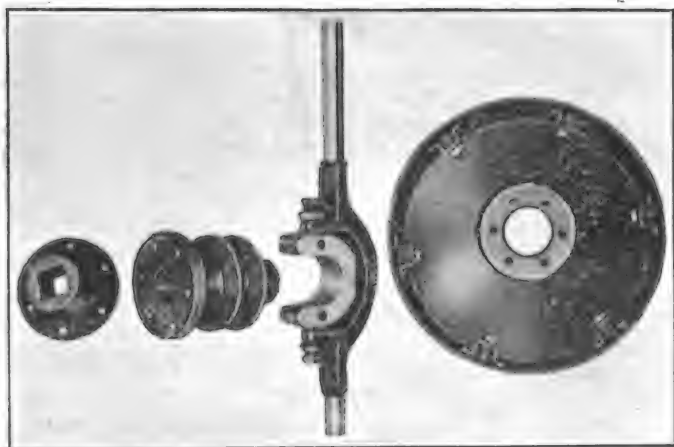
If the clutch facing is simply dirty or coated with grease and presents a smooth surface, it may be cleaned by soaking it in kerosene oil. After the surplus oil and grease has been removed the facing should be liberally coated with neats foot oil before it is put in place. Using a worn clutch facing is poor economy, however, and in case of doubt the best plan is replacement.

Before the clutch is replaced the clutch release collar should be removed from the clutch shifter yoke, the oil cover removed and the oil reservoir and oil holes thoroughly cleaned with kerosene and a brush.

The transmission gearset is fastened to the cross member or cradle which surrounds the engine flywheel by two bolts. These bolts must first be removed and the four bolts which fasten the universal joint housing together are taken out. The transmission gearset may then be lifted from the chassis, the universal joint slipping from the driving shaft.

Disassembling of the Gearset.

The gearset is disassembled as follows: First remove the four nuts holding the cover and lift off the cover with the gear change lever attached. Unless there are evidences of wear the cover or control mechanism should not be disturbed. Next remove the bolts holding the front ball bearing cover into place; this is the cover surrounding the square driving shaft on the front end of the gearset. The ball bear-



Clutch Components in Their Relative Positions: From Left to Right: Clutch Hub Drive Ring, Clutch Hub, Clutch Shifter Yoke with Clutch Collar, Clutch Cone Assembly.

ing race may now be driven from the case, using a piece of wood and a hammer. After the bearing has been removed the main drive shaft, with gear attached, may be slipped through the front end of the gearset case.

The universal joint should next be removed from the shaft. It is made in four sections, there being two Y shaped members which are fitted to the propeller and transmission gearset shafts respectively, and two rings which fasten these Y shaped members together. The rings are bolted together and the removal of the bolts disassembles the unit. The member on the gearset shaft is held by a nut, so this nut must be removed and the part drawn from the shaft.

The cap screws holding the universal joint housing to the gearset case are next taken out and the housing removed. The ball bearing at this end of the shaft is removed as was that on the other end. The drive shaft may then be removed from the gearset, the second speed gear, as well as the reverse and low speed gears, sliding from the shaft inside the case.

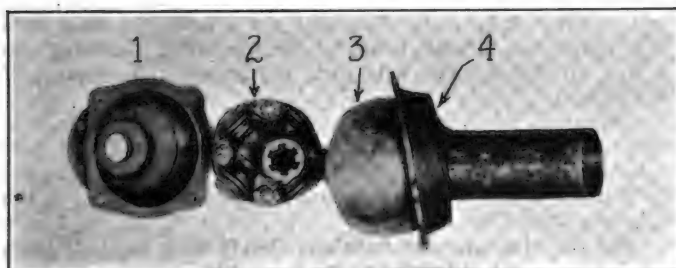
The countershaft with the three gears mounted upon it is held into the gearset case by a cotter pin passed through the front of the shaft and casing. After this pin has been removed the shaft may be slipped from the gearset, leaving the gears in the case.

The idler shaft is held into the casing by a pipe plug. When the plug is removed the shaft may be withdrawn from the gearset, leaving the reverse idler drive gear and the driven gear in the case.

As to Gear Replacements.

A good rule to follow in the case of worn gears is to replace both the driving and the driven gears, if either is to be replaced, for the reason that if a new and a worn gear are run together the new gear is soon worn to conform with the old one.

The essential points of wear in the transmission gearset are the bearings and the bushings. The bearings should be



Universal Joint Components: 1, Front Housing; 2, Universal Joint; 3, Rear or Ball Housing; 4, Retaining Collar.

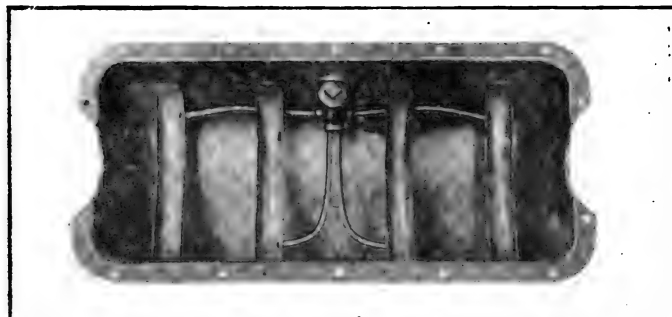
carefully examined and replaced by new if either of the ball races show signs of wear. The bushings should be removed if there is the slightest play between the shafts and the gears and replaced by new. For removing bushings a bolt with a washer on the end of it slightly smaller than the outside of the bushing and a collar large enough to slip over the bushing can be used to advantage.

After the rear of the car has been strongly blocked up the rear spring clips should be removed and the bolts which fasten the rear end of the springs to the axle taken out. The brake rods should be unfastened at the universal joint end of the propeller shaft and the rear axle unit, with the propeller shaft and housing, can be slipped from under the car.

The first step is to remove the propeller shaft and housing. This is done by unscrewing the nuts holding it to the rear axle, unfastening the brake rods and slipping it from the axle. After the roller bearing retaining screw has been removed with a heavy piece of wood or lead held against the front or universal joint end of the shaft, and the housing firmly held, a blow against the lead or block will drive the shaft, pinion gear and bearing assembly from the housing.

Reassembling the Propeller Shaft.

In reassembling the propeller shaft two things are to be observed. The ball thrust bearings, as well as the roller bearings, must be fully seated or the gears will not mesh properly. Before returning the bearings to their housing the



Lower Crank Case, Showing Oil Distributor Body and Oil Tubes Leading to Splash Pans.

interior of the housing should be thoroughly cleaned. If a new pinion gear is to be fitted to the shaft, it is essential that the bore of the pinion fully contact with the taper of the shaft.

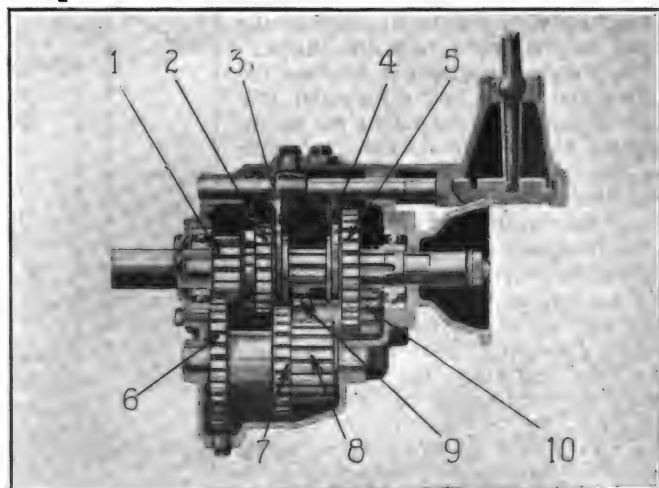
To determine whether the shaft and the gear fit, spread a thin coat of Prussian blue over the inside of the pinion gear and press the gear on to the shaft, an even coat of blue transferred to the shaft after the gear has been turned once is an indication that the fit is tight or smooth. If the points of contact are but few the gear should be "ground on" as follows:

Smear a little valve grinding compound upon the shaft and put the gear into place upon the taper. Grind it upon the shaft with a reciprocal motion similar to the one used in grinding a valve into place. Much depends upon securing a good snug fit, so one should take plenty of time and make the job a good one.

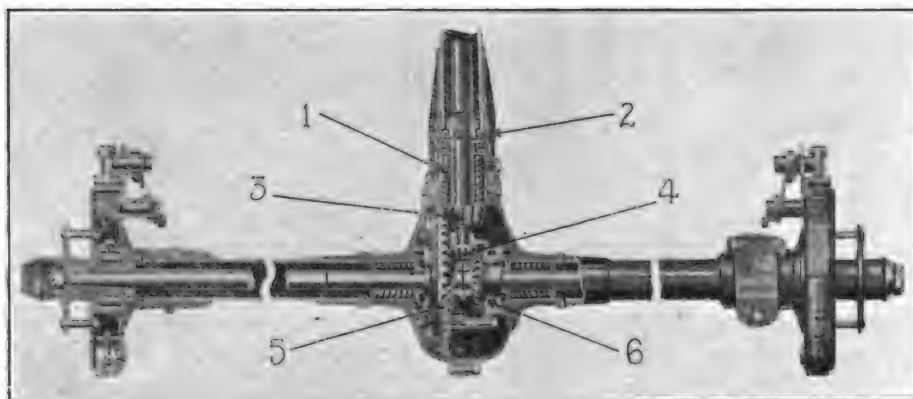
Pinion and Master Gear Construction.

Another important point is the adjustment of the pinion and master gear and their relation. To understand this more fully let us take up the construction. Upon the lower end of the propeller shaft is fastened the pinion gear, and the hub of this gear rests against the roller bearing washer. The roller bearing is seated against a steel washer which forms one side of the ball thrust bearing. Between this bearing and a second bearing similar to it is placed a steel washer upon which the balls of both bearings roll. The washer on the back of the ball bearing assembly seats against the seat in the propeller shaft housing. Against this washer the adjusting nut on the propeller shaft revolves. One can see that the whole bearing assembly is held between the shoulder of the pinion gear and the adjusting nut, and between these two parts there should be no play.

The easiest way to make this adjustment is while the bearing assembly is from the car. Upon the propeller shaft slip



Transmission Gearset Cut Away View: 1, Main Drive Gear; 2, High and Intermediate Gear; 3, Shifter Yoke; 4, Low Shifter Yoke; 5, Low and Reverse Gear; 6, Countershaft Drive Gear; 7, Countershaft Intermediate Gear; 8, Countershaft Reverse Gear; 9, 10, Idler Reverse Driven Gears.



Rear Axle Partially Cut Away: 1, Propeller Shaft Roller Bearing; 2, Ball Thrust Bearings; 3, Pinion Gear; 4, Differential Pinions; 5, Master or Drive Gear; 6, Differential Gear.

the bearing assembly in the same relative position as it holds in the car. Then put the pinion gear, key and retaining nut into place, screwing the nut up tightly. There should be no play of the bearings between the adjusting nut and gear, and if there is, the cotter pin, which passes through the adjusting nut, should be removed and the nut screwed down the shaft until the play is compensated, then the cotter pin should be returned. Care should be used not to make the adjustment too tight. The bearings may now be taken from the shaft and put into the housing as directed above.

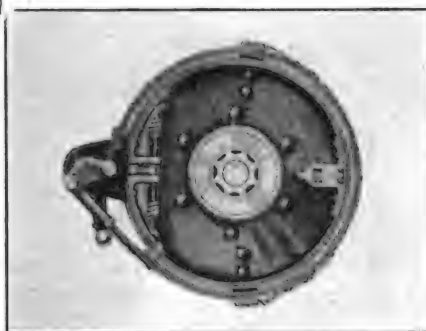
The rear axle should be placed upon two horses or boxes for disassembling. With the axle in this position the hub caps and wheels are first removed. The nut on the end of the rear axle truss rod can then be removed from the housing.

The bolts at the centre of the axle housing are next taken out and the two sections of the housing slipped from the differential and shaft assembly. The differential is held together by three studs and nuts, the nuts held from turning by a length of wire through the three studs. The wire should be cut, the nuts removed and the smaller part of the differential case removed, exposing the differential gears, the pinions and permitting their removal.

The differential gears are held to the shaft by a split ring, which is removed by driving the gears back upon the shaft about one-quarter of an inch. After the ring has been removed the gears can be drawn from the shafts.

Any play or lost motion between the differential gears and differential pinions should be compensated for by inserting the proper thickness of fiber washer between the differential case and differential gears, being careful to keep the washer on either side the same thickness as the one on the other.

The roller bearings on the inside of the housing at the centre of the rear axle slip out of the outer races, or so called differential bearing lining with the axle, and these can be removed after the differential has been disassembled. The replacement of the old outer race once it has been removed is very difficult, for removal is quite certain to distort it. If for any reason the race is removed, it should be replaced by a new one. The outer race of the roller bearings at the outer end of the housing being held in by a set screw may be removed, often without



End View of Rear Axle Showing Brake Adjustments.

damage, if care is exercised.

The brake bands should be examined carefully and should the fabric facings show signs of wear or appear smooth, these should be treated in the same way as the clutch facing. The external contracting brake band is removed by unfastening the band from the toggle stud and pressing down on the brake band clips. The internal band is bolted to one anchor stud at the back and when this bolt has been removed the band may be slipped from the axle housing.

Proper adjustment of the service brake bands is essential. After the car has been reassembled, both rear wheels should be jacked and an assistant should hold the service brake pedal forward slightly, so as to put a slight drag upon the wheels. The brake band on each wheel should be adjusted so that the friction is the same, and to determine this a number of tests should be made with the pedal at different positions.

About the only part of the front axle subject to wear is the steering knuckle and the king bolt holding the knuckle into place.

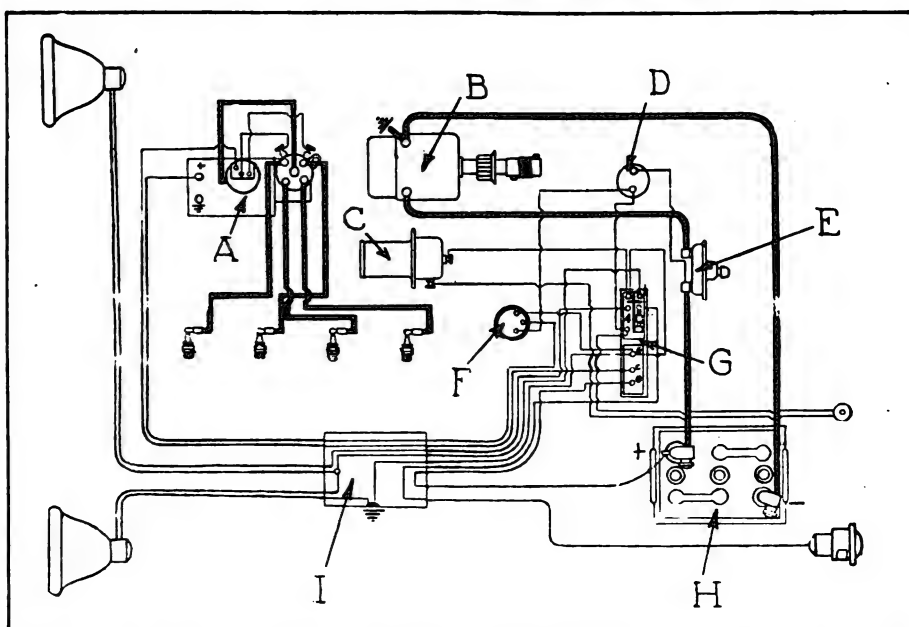
The hub caps are first removed and the cotter pin and nut removed. The nut on the right hand axle is a left hand thread, while the one on the left side is right hand. The outer or stationary cones may next be unscrewed, permitting the removal of the wheels.

The steering knuckle is mounted on the front axle and pivots upon the knuckle bolt or king pin. The king pin is held into place by a castellated nut, which must be removed and the king pin driven up through the axle fork, permitting the removal of the knuckle.

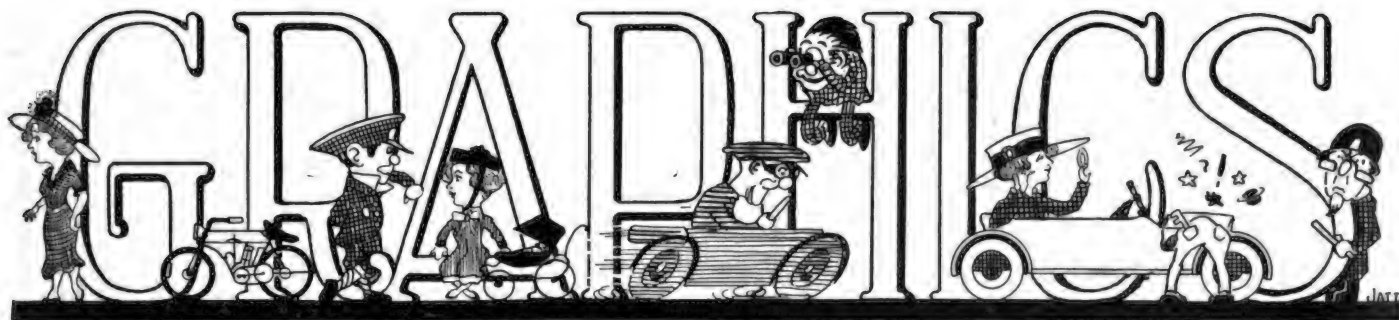
Too much emphasis cannot be put upon the importance of complete restoration of this part of the machine. Every part should be carefully examined and the oil completely cleaned so that no breaks will be overlooked. The oil channel in the king pin should be cleaned.

The steering knuckle bushings should be a snug fit upon

(Continued On Page 48.)



Wiring Diagram of Chevrolet Starting, Lighting and Ignition System: A, Generator; B, Starting Motor; C, Horn; D, Ammeter; E, Starting Switch; F, Circuit Breaker; G, Ignition and Lighting Switch; H, Battery; I, Junction Box.



"Stick to your last" and "too many irons in the fire" are old axiomatic sayings, which, if they had been heeded by a New York accessory dealer, would have saved him from a state of bankruptcy. He was making money fast out of motorists and should have obeyed the principle of the first saying and stuck to his business, but he decided to back a more ancient form of transit and went too often to the race tracks, where to his sorrow the "ponies" ran opposite to the way he placed his bets. His extra irons in



the fire cost him \$25,000, according to information imparted to the judge.

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With the mobilization of the troops and the gradual increase in the tonnage from this country abroad, it is thought an excessive demand will be made on the oil companies. Unless production of gasoline is increased very greatly it is thought very probable that the cost of "flivving" will be more expensive within a short time.

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The public has long been wont to overdo a "good thing" such as free accommodations of any kind, but the most flagrant case of this ingratitude toward the dispensers of these favors was dis-



covered by a western garageman, when, upon emerging from his shop, he found a corpulent gentleman seated in his car with the "free air" supply tube directed against his sweating countenance, the stream of air blowing away the beads of perspiration.

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Feeling piqued when he found a summons in his car to appear before the police commission to answer a charge of violating some mysterious clause in the



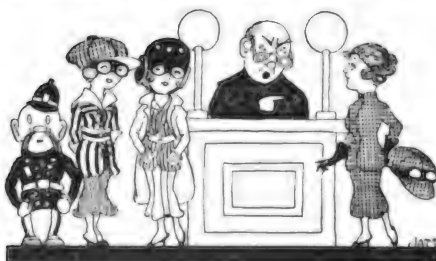
traffic laws, a salesman in Providence cranked up his puddle jumper and sped to police headquarters, with a sentence of seven years under water staring him in the face. The mystery deepened because of the fact that he enjoyed close personal acquaintanceship with all the commissioners, and they declared the summons to be spurious. After nodding wisely to one another he set out on an earnest search to find the perpetrator of the sinister document with an invitation. Said culprit was not declared in on the libation, but took his refreshment alone while musing over the consequences of illtimed jokes.



Women have long held the talking championship for distance without changing their minds or breath, but to a Los Angeles woman goes the honors for a long distance auto trip without changing gears, which is said to be an exceptional feat for the average driver. Mrs. C. F. Crank, the holder of this unique title, drove her car from Los Angeles to San Francisco, a distance of 430 miles, without once throwing out of high.

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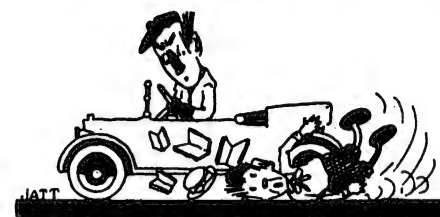
Three pretty maids all in motor togs and wearing their most seductive smiles, faced Magistrate House in the traffic



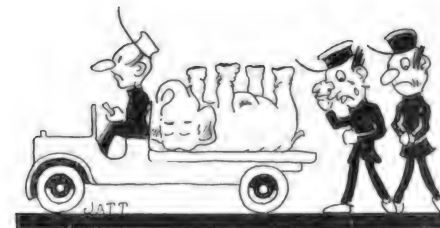
court in New York City the other morning, but this silent plea for leniency and forgiveness failed to penetrate his honor's dignity and soften his judicial temperament. For passing the traffic cops on Riverside drive and other points at a speed which made the minions of the law jealous, they were asked to forfeit from \$25 to \$40 to remind them that it was not permissible to overspeed on the highways.

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The average school boy has about as much affection for his reading, 'riting



and 'rithmetic as the general public has for the chief of the Hohenzollerns, but there is a boy in a Bay State village who has a fond attachment for his school books owing to the fact that they probably saved his life, as did the Bible that the soldier was carrying over his heart when a bullet came and spent its force among the leaves. The boy was coming along the street carrying his school books under his arm when struck by a motor car. The blow knocked him down, but most of the force was spent in scattering the books and prevented a serious injury.



"Dunk," the famous pachydorn, who entertained the peanut munchers on the circus bleachers for many years and later retired to the Zoological Park in Washington as exhibit A is no more. His death was not naturally, but owing to an unfortunate mishap he had to be Oslerized with the soporific influence of eight bullets from a .45 caliber rifle. The performance of the last rites for Dunk were commensurate with his size, his weight of six odd tons requiring the requisition of a 3½-ton Packard truck to carry him to his last resting place.

PLATE SIX

COMMUNITY GARAGE OF FOURTEEN STALLS

Laid Out for a Lot 100 Feet Square, Containing a
Court Yard, Repair Shop, Heating Plant and Stores

Designed by the Architectural Department of the Automobile Journal Publishing Co.

GARAGES as real estate investments are at present one of the most active features in the realty field. There are many lots in some neighborhoods where the modern type of community garage can be erected with the certainty of its proving a paying proposition. The automobile owner is always ready to pay for accommodations and any garage offering him extra conveniences and facilities can usually gain the patronage even at a higher figure than is charged by garages where only necessary quarters are furnished.

Such a garage of the community type as shown in the accompanying plate is designed for the average city neighborhood and to front on a street where there is considerable traffic in order to rent the two stores advantageously.

The garage is laid out for a lot 100 feet square and contains a large court yard in the centre 56x63 feet, affording ample room for manoueuering the cars about before running them in the stalls or repair shop. Two stores flank the main entrance and the rear corners are occupied by a boiler room and repair shop, the latter being equipped with drain, two pits, sink, work bench and closets. If the location is proper the owner may conduct one of the stores as an automobile supply station or agency and operate the repair shop as a side line.

In all there are 14 stalls, or compartments, each a private garage in itself, complete in every detail. The stalls are ample in size to house the largest of touring cars, being 10 feet wide and 20 feet deep. Each compartment is equipped with a steam heater and electric lights and running water with bowl is provided. All these conveniences are provided and maintained by the owner and are covered in the monthly rental.

The boiler room is designed for a plant to heat the entire structure. It leads from a small vestibule, which also opens into small janitor's room containing a set bowl and toilet. If the owner desires to have a large cellar for storage provision is made for three stairways leading off the stores and boiler room.

The main structure is of brick, tile and terra cotta construction. The party walls and curtain walls are of common brick, as they are not exposed to view on the outside. Tile and terra cotta are used in the front elevation, backed up with brick. Brick may be substituted for the terra cotta and the same effect obtained.

Foundations should be made of good concrete,

sufficiently large to support the superstructure, for which this department will furnish specifications and formulas upon application.

A roof of tar and gravel is considered the most satisfactory for this type of building, a good combination being five-ply tar and gravel. Lead flashing should be used or toncan metal, if builder desires to go to the extra expense.

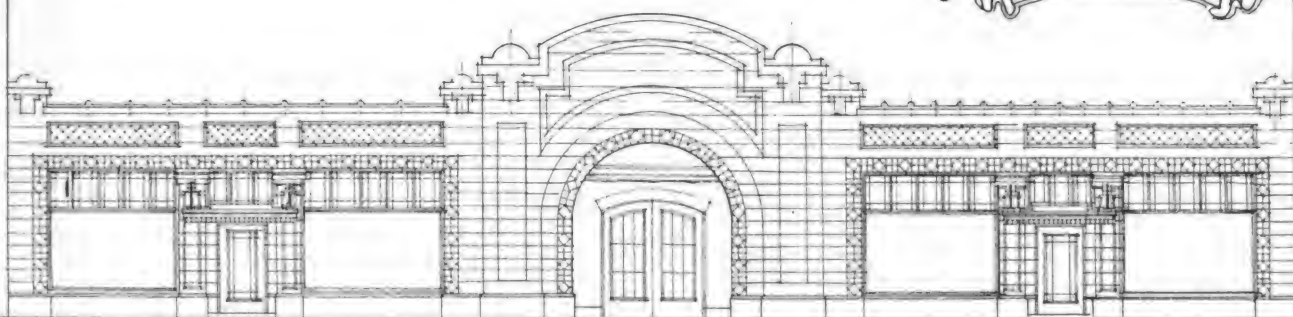
A large skylight with ventilator in the top furnishes efficient light and ventilation. The lighting effect is also aided through the large glass panels in the front doors which occupy most of the door area.

A considerable variation in the cost of a garage of this type will be found owing to the difference in ground rents, labor and cost of materials in various sections of the country. The garage could be erected under average conditions for from \$10,000 to \$15,000.

The income from such an investment, however, would depend largely on location and management. At prevailing garage rates where similar service and facilities are afforded the rentals on the stall alone should aggregate between \$1500 to \$2000 annually, while the store rents would vary from \$40 to \$100 a month each, the figure being entirely dependent upon location. Assuming that the two stores brought in \$100 a month rental, a total of about \$3200 a year would be realized. There would be considerable extra profit, however, from the investment, should the owner engage in the supply business and other branches of the automobile business, for which an exceptional opportunity would be created in the existence of the garage.

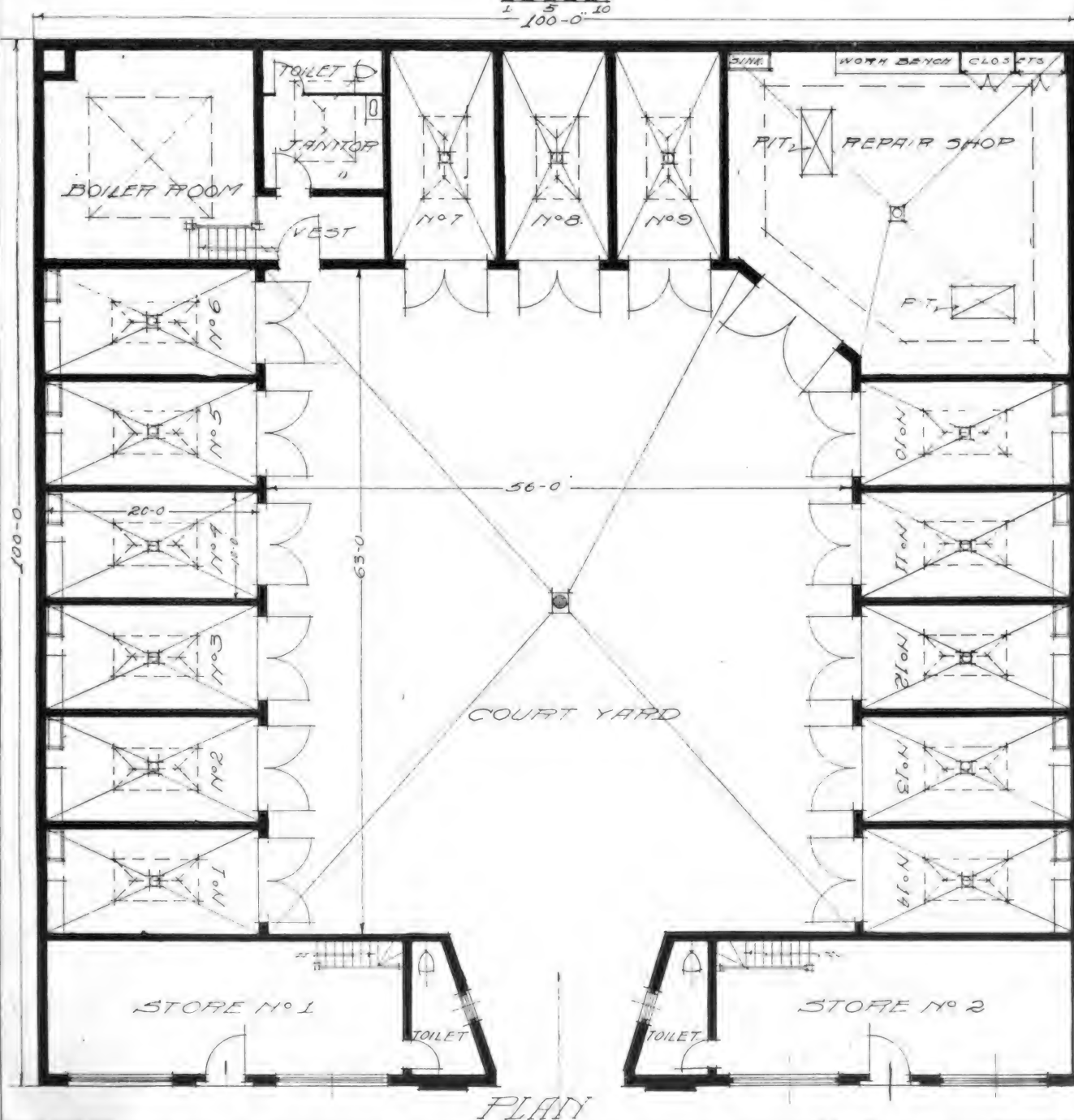
In all the large cities motorists are inclining toward the community type of garage with individual stalls, as it not only saves them time and trouble, but once the car is in its stall they know it is safe from prying hands and when they want to get it out there is every facility at hand for preparing for a trip. These conveniences are recognized generally and motorists are willing to pay the increased rental which is necessary to obtain them.

As the modern apartment house was the forerunner of adequate housing for people in the large cities, so the community garage presents itself as a solution of the problem of housing their automobiles. One walks into his apartment, locks the door and calls the place his home, while his automobile has been put away until he wants it again in a locked room around the corner.



ELEVATION

SCALE
1 5 10
100-0"

$$\begin{array}{r} 1 \quad 5 \quad 10 \\ \hline 100 - 0 \end{array}$$
$$\frac{1}{100} - 0 = \frac{10}{100}$$


Midsummer Motoring Modes and Fancies

NO MATTER how fond a woman may be of motoring, she generally considers it a great nuisance to pack and unpack her motor trunk or bag when on a tour and probably nothing would prevent it being somewhat troublesome. But the bother could be considerably lessened by having as complete a motor trunk and touring outfit as possible and a most important point is having in one's home a special box or drawer and clothes press where motoring things are kept when not in use. When planning for a tour a complete list of what one wants to take away is a great help. Then when it is time to pack the trunk and all these things are ready, everything goes easily and quickly.

Manufacturers of trunks have taken the needs of the motorist well in mind and have given the tourist the best examples of their skill and ingenuity imaginable, so that the packing of the motor wardrobe and the condition the garments are in upon reaching the destination are all that the most particular woman could desire. The distance of the journey has little if any effect upon the wardrobe, the garments come from the trunk in as good condition as though hanging in one's clothes press at home. The Belber trunks are specially designed for motor traveling and are veritable carryalls, wholly complete, yet flat and occupying but a small amount of room. Dinner frocks, blouses, suits, shoes, hosiery, hats, underwear, toilet requisites, skirts and miscellaneous articles may all be snugly packed in one of these trunks and the motor woman may feel well groomed at any of the smart hotels where she stops enroute. The Express, Limited, Overland and Traveler are Belber models that are excellently adapted for motor touring. These trunks have a hard vulcanized fiber covering, are well and strongly bound and are lined with

Stylish Raiment for the Day's Outing on the Beach, Tours; and Accessories of Travel

By Mrs. A. Sherman Hitchcock.

leatherette or printed cloth. Shoe and laundry bags are provided and the fit all holder allows one to carry all the toilet articles desired.

Conveniences in Motor Trunks.

One of the greatest conveniences in packing the motor trunk is to have cases made like envelopes for blouses and gowns. They should be made of dimity. The envelope flap, buttoning over, keeps it closed and gives the least trouble.

The white motor coats built of the lovely Waterside Corduroy are the loveliest things imaginable in the way of summer wraps. Of course, such a coat is not for rough wear, but worn over the satin or crepe motor frock to the dance or the restaurant, nothing could be more effective or lovely. Even though they soil easily they may be cleaned quite as easily and their suggestion is dainty dressiness, something which appeals to very many motor women. A most delightful model recently seen was of white waterside corduroy with a soutached band in white trimming, the collar and a wide soutached belt, which ended in long sash like points at the front, each point ornamented with a white silk tassel. This coat was worn over a frock of tea rose sportoplin, made very simply and effectively, its only trimming being the running stitch so fashionable at present. This stitch is done by hand with sewing silk, long and short stitches alternating and the long stitches coming on the outside. The stitching was done in black, which rendered it particularly smart and effective, and the simple shirred skirt was narrowly bound in black satin.

Vivid colors for motor coats are decidedly fashionable this season and the coral, gold, amethyst and fern of the waterside material makes a stunning motor wrap. They are made into big collared, big pocket-

ed, graceful garments, with cleverly placed belts, and are usually lined with flowered materials or in some contrasting color. Some of the models, especially intended for country club and other smart social affairs, are unlined and may be easily tubbed when soiled. Waterside corduroys have an exquisite weave, a smart width of cords and an unusual range of attractive colors. They will stand the most rigorous test of wear, which render them particularly adaptable for motor wear.

There could not be a motor wardrobe without separate skirts to wear with the many delectable blouses so deservedly modish this year and there is no more adaptable or attractive material for a skirt of this character than waterside corduroy. These skirts need no elaboration, the large pockets and pearl buttons giving them the necessary smart appearance. A skirt of white corduroy, blouse of sunset sportussah embroidered with a dull blue and a girdle flaunting two blue tassels and a corn colored coat of bolivia or duvetyn makes a fascinating outfit.

Clothes for the Beach.

The woman who motors to the beach but does not always desire to take advantage of the swimming and bathing, but rather watch others from a comfortable seat on the shore, finds a suit of silverbloom ideal for her wear. In this August weather the big achievement is to get into a costume that will make one feel both cool and well dressed for the occasion and the silverbloom and St. Nicholas cloth are ideal for this purpose. An excellent type of suit is herewith illustrated. It is a combination of striped and plain silverbloom and the lines are straight and tailored. The newest and smartest things about this suit are the belt, which begins at the side front and extends to the back, the modish cut of the narrow collar and the very wide pockets. The skirt is of medium fullness and is shirred on a narrow stitched belt.

Though it has already outlasted a number of seasons, jersey cloth has no rival. I am showing two charming models of the fashionable La Jerz and a smart tailored suit of Golfex, a shower proof material, which does not wrinkle



Isn't This Icy-Hot Motor Restaurant One of the Very Best Reasons for Going on a Picnic? It is Complete in Every Detail and Keeps the Food in the Exact Condition in Which It Is Prepared.

(Courtesy Icy-Hot Bottle Co., Cincinnati, O.)

Now That the Manufacturers of Trunks Have Turned Their Attention to the Motor Woman's Needs There Is No Reason Why Milady Mobile Cannot Be Properly Clothed for Any Occasion When on a Tour. The Belber Trunks Give a Maximum of Comfort With a Minimum of Space.

(Courtesy Belber Mfg. Co., Philadelphia, Pa.)





Two of the Newest Creations in the Modish La Jern. The Three-Piece Suit Is Ornamented with Much Embroidery and the Frock Carries the Smart Braiding of Soutache. For Touring the Frock and Coat Suit Would Be Most Appropriate, While for a Rather Dressier Kind of Wear the Braided Frock Could Find No Equal.

or "bag" even when dampened. This material comes in all the rich heather shades of grays, greens, browns, blues, olives, purples and reds, all of which are well adapted for motoring wear.

New Money Receptacles.

As money is really the important thing on a motor tour, it is well to provide a safe place for it. A money belt may now be purchased of khaki or pigskin with a large pocket for bills and four small pockets for loose change. Chamols pouches with good clasps are liked by some motor women. These are usually worn under the skirt and are fastened to a belt. The same styles may be found in linen and some cotton materials.

Every woman who drives her own car will be interested in the motor expense books. Each page is ruled off into columns headed with various expenses and operations incident to the car's upkeep. There are records of the time new tires were placed in position and of the time they are taken off, of their expense, of the amount of gasoline used for various runs and tours, in fact, there is a place for every sort of record that the motorist might want to make if she keeps accurate count of her motor expenses.

Motor Picnic Accessories.

Many motor women have been rather slow in embracing the motor picnic, for they have been quite apt to dismiss them on the plea of "too much trouble." But with the splendid motor hamper many little inconveniences have been done away with and the lure of the outing and the picnic luncheon has become too strong to be resisted. The icy-hot motor restaurant certainly makes things easy

for the motor woman. Everything is so compact and so convenient and they may be had complete for four people or for six. The removable tray contains nickel plated lunch box and compartments for jelly jar, cups and icy hot bottle or jar. Three lower compartments are for quart



Tailored Suit, Built by a Leading Designer for the Motor Woman, Is of Blue Goldflex and Smartness Is Indicated by Its Simplicity and Good Taste. (Courtesy Wilkin & Adler, New York City.)



One of the Newest Motor Models in Millinery Made of Taffeta and Straw. The Veil Is the New Scroll Design and Comes in All Shades. (Courtesy Franklin Simon & Co., New York City.)



For the Motor Woman Who Does Not Go in for Bathing or Swimming, but Prefers to Watch Her Party from the Beach, There Can Be No More Satisfactory or Smart Outfit Than One of This Character. Built of Silverbloom, One of the Ideal Materials for the Motor Woman's Use.

bottles, jars or lunch. There is a complete equipment of plates, cups, knives, forks, spoons, napkins, etc. The inside of the hamper is lined with a water proof enameled fabric of very attractive black and white striped design after the Bakst creations. The outside is black enameled water proof material with a patent leather finish.

Rubberized silk air pillows and hot water bottles are always touring conveniences. They come in small envelopes to match. Traveling soaps come now in leaves and powder comes in the form of a pocket powder book so that it can be slipped into a purse or hand bag with nothing to spill. The leaves of the book, which come in either pink, white or flesh, are absorbent, and one leaf is sufficient for an ordinary application, after which it can be thrown away. Aseptic handkerchiefs, made of soft paper, come in packages of six and are especially recommended to motorists.

Writing Utensils for Motorists.

Motor women who appreciate the advantages of having writing utensils always at hand will like the motor writing cases equipped with writing paper and envelopes, postals, fountain pen, lead pencil and address book, with the name of the owner and address plainly written on the first page. The "just a line" pads whose sheets fold so as to form an envelope are a decided convenience. It really seems as though the problem of economy of space has been solved to the extent that a motor woman can, by possessing herself of the many new traveling conveniences, change a tiresome journey into one of extreme comfort.



The Economy Eight-Cylinder Car; Priced at \$1395.

FEATURES OF ECONOMY MODELS

A New Car in 4-36 and 8-48 Types Is Announced by Tiffin, O., Company

The Economy car is a newcomer, manufactured by the Economy Motor Car Co. of Tiffin, O. At present the company is confining its efforts to only two models, the touring car and the three-door roadster. The touring car is large and roomy and will easily accommodate five passengers. The unit power plant is in two types, four-cylinder and eight-cylinder. The engine of the latter has cylinders of three-inch bore, $3\frac{1}{4}$ -inch stroke, with removable heads and is of the valve in head type, with an individual cam to each valve. Valves are adjustable on the top. The water and gas intake manifold are cast in one so that gas passes into the cylinders at the same temperature that the water comes off, thereby securing greater efficiency of the gasoline consumed.

The body is of the popular streamline type, with a double cowl and with extra room in the tonneau, which carries a 15-degree slope windshield. The upholstery is in heavy black dull imitation leather. The body is painted a standard blue black and rubbed to a piano finish.

The touring car or club roadster in a four-cylinder model is \$1040 and in the eight-cylinder model \$1395.

HUDSON WITHDRAWS ITS RACING CARS FROM CONTESTS.

The Hudson Motor Car Co. has decided to withdraw its racing team from further participation in the speedway contests this year. Ralph Mulford, Ira Vail and A. H. Patterson, who have been driving the Hudson cars so far this season, it is understood may possibly arrange to retain the cars they have been using and enter some of the important events that are still scheduled.

PIKES PEAK CONTEST FOR STOCK CARS ONLY.

The Pikes Peak Hill Climbing Contest, a race up the world's highest highway to the summit of the peak, will be held on

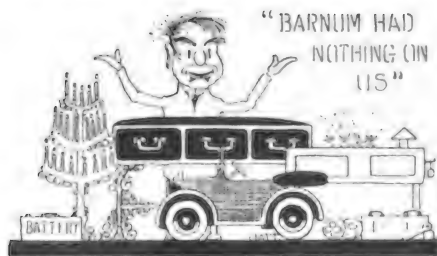
Sept. 8. Entries, which were closed Aug. 8, are restricted this year to gasoline motor stripped stock car chassis complying with the A. A. A. 1917 definition of a stripped stock chassis and limited to models of 1916 and 1917 of manufacturers producing 100 or more cars in 1916.

Greater interest will be shown in the race this year it is believed owing to the elimination of all freak machines. The prizes are also exceptionally attractive, including the Penrose trophy and \$2500 in cash.

The course over which the contest will be held is looked upon as one of the greatest highways in the world. It is a modern boulevard 20 to 50 feet wide, extending for 18 miles up the side of Pikes Peak, with an average grade of seven per cent. and a maximum grade of 10.5 per cent. From the starting point of the race at Crystal Creek bridge the course is 12 miles long and rises 6694 feet to the summit of the mountain, which is 14,109 feet above sea level.

MOTOR CARS AND SIDE LINES.

Everyone is familiar with the old general store in country towns where the storekeeper's stock includes everything from garden seeds to pianos, but it is doubtful if a manufacturer exists whose products include such a varied and diversified line as those of a Buffalo man who, in addition to operating a railroad and smelting plant, manufactures automobiles, incubators, coffins, battery boxes and a few assorted lines of automobile parts.



N. Y. MOTOR FEDERATION HOLDS HEADLIGHT TESTS.

Officials of the New York State Motor Federation tested 38 motor car headlight devices in the Syracuse University Stadium recently, to determine if they met the requirements of the new statutes in force in New York state governing the operation of motor cars in the night time.

The tests were attended by a large number of representatives of the different manufacturing companies engaged in the manufacture of headlight devices and a large number of those tried out were approved as coming within the requirements. The committee that conducted the tests consisted of George C. Diehl, chairman of the good roads committee of the American Automobile Association; Bradford Devine of Utica, C. A. Halverson of Lynn, Mass., an electrical engineer. The technical committee was advised by John J. McInerney, general counsel of the New York State Motor Federation.

Following is a list of the devices approved: Letts deflector, Manifold Heater Co., Cortland, N. Y.; Rand reflector, Rand Mfg. Co., Haverhill, Mass.; glare screen, Palmer Glare Screen Co., Cleveland, O.; Offset reflector, C. T. Sutterley & Co., Philadelphia, Pa.; Stryker reflector, C. L. Stryker, Buffalo, N. Y.; Ames reflector and Ames elliptical reflector, Heinze Electrical Co., Lowell, Mass.; Pennock headlight tilters, Specialty Mfg. Co., Minerva, O.; tilting reflectors, Cadillac Motor Car Co., Detroit, Mich.; Warner Lenz, Warner Lenz Co., Chicago; Star diffusing lens, Lancaster Lens Co., Lancaster, O.; No-Glare-On Lens, No-Glare-On Co., Watertown, N. Y.; More-Lite Lens and More-Lite Amber Lens, L. E. Smith Glass Co., Mount Pleasant, Pa.; Da-Lite lens, Jeanette Toy and Novelty Co., Jeanette, Pa.; Saferlite lens, Saferlite Lens Co., New York City; Primolite lens, Standard Glass Specialty Co., Morgantown, W. Va.; Legalite lens, Legalite Corp., Boston, Mass.; Crew Levick fractor, Crew Levick Co., Philadelphia, Pa.; Mac-Kno Glare swivel bulb, F. F. MacLean Co., Syracuse, N. Y.; Perrin No-Glare, Perrin Mfg. Co., Detroit; new Osgood lens, Osgood Lens and Supply Co., Chicago; Omolite Co., Jamestown, N. Y.; Holophane headlight lens, Holophane Glass Co., New York City; Conaphore Novoil glass and Conaphore clear glass, Corning Glass Works, Corning, N. Y.; Crockell Reflector, C. W. & C. H. Crockett, Troy, N. Y.; Rite Ray, Reflex Co., Newark, N. J.

The committee will conduct tests of other devices that are designed to meet the statute requirements.

NEW PLANT FOR MITCHELL MOTORS CORPORATION.

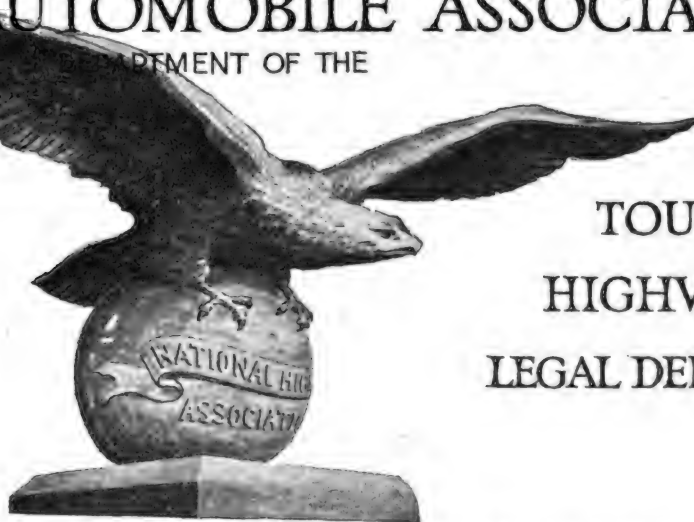
The plant of the Mitchell Wagon Co., Racine, Wis., has been acquired by the Mitchell Motors Corporation and will be used by the latter corporation for the manufacture of bodies and coach work.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Some New Connecticut Motor Vehicle Laws

Stringent Provisions in the New Statute Governing Speeds and Very Strict Limitations Placed on the Use of Glaring Spotlights

IN RESPONSE to many inquiries we present here a summary of the new motor vehicle law of the State of Connecticut, which became effective from the first of July.

Speed Regulations.

The general provision governing speed is that no person operating a motor vehicle on any public highway in the state recklessly or at a rate of speed greater than is reasonable and proper, having regard to the width, traffic and use of the highway, or so as to endanger the property or the life, or limb of any persons.

And in order that there may be no misinterpretation of this provision the statute proceeds to define it by stating that if you are traveling at 30 miles an hour in country districts for a quarter of a mile, or at a rate of 20 miles an hour for the same distance where the buildings average less than 100 feet apart, then it is evidence that you are violating the above speed regulations.

Moreover, in the country sections, if you are going more than 10 miles an hour at any highway intersection or around a sharp curve or over a bridge more than 25 feet long, it is evidence of a violation of the law.

Commercial Vehicles.

Commercial vehicles not equipped with pneumatic tires violate the statute if they are driven at a rate of speed faster than 15 miles an hour, or faster than eight miles an hour over a bridge.

Passing Trolley Cars.

Motorists are prohibited from passing

to the left of a standing trolley car unless they have a clear and unobstructed view and right of way, at a higher rate of speed than five miles an hour, providing, however, that you must not in any event approach a car nearer than 10 feet.

Upon approaching a street car that has stopped to receive or discharge passengers, motorists, passing such a car on the side where passengers are ordinarily received or discharged, must bring their cars to a stop not less than 10 feet from the rear of such car.

Reasonable Speed.

Section 33 is an important provision of the law. It provides that any three residents who have witnessed a violation of any of the provisions of the automobile law may make an affidavit to that effect and address it to the automobile commissioner, who will proceed as the law requires. The provision enables the "people" to take the initiative in furthering public safety whether local authorities act or not.

Mufflers.

Every vehicle must be equipped with a muffler or other device to prevent unnecessary noise. No person is to make an unnecessary noise with bell, horn or other signaling device. No motor vehicle shall be operated upon any public highway between the hours of 9 p. m. and 7 a. m. unless the exhaust from the engine shall be effectively muffled, nor shall any motor vehicle be operated between the hours of 7 a. m. and 9 p. m. unless the exhaust from the engine of

such vehicle shall be reasonably muffled so that explosion of such motor while so operated shall not constitute a nuisance to the public.

Lights.

Any light thrown directly ahead or sideways shall be so arranged that no dazzling rays or beams or reflected light from it, or from any reflector, shall at any time be more than $3\frac{1}{2}$ feet above the ground on a level road at a distance of 75 feet ahead of such a vehicle and such light shall be sufficient to enable the operator of a motor vehicle to see any person, vehicle or substantial object upon the roadway, or at the side of the road, within 10 feet on each side of the motor vehicle and 10 feet ahead of such motor vehicle.

No spotlight shall be used when another approaching vehicle is in sight, except when projecting its rays on the ground at a distance not exceeding 30 feet in front of the vehicle using such a spotlight and to the right of the centre of the highway.

Motorcycles.

No motorcycle shall be operated with its muffler open.

Rules of the Road.

Any person who shall meet another walking in the traveled portion of a highway or riding, driving or leading a horse or other animal therein, or driving or operating a vehicle therein, shall slacken his pace if necessary, and reasonably turn to the right so as to give half of the traveled road, if practicable,

and a fair and equal opportunity to pass to the other; if he overtakes another the person overtaking shall pass to the left side of the person overtaken and the person overtaken shall, as soon as practicable, turn to the right so as to give half of the traveled road as a free passage on the left to the other.

Right of Way.

The person overtaken and passing to the left of the person or vehicle overtaken shall do so subject to the right of way of those traveling in an opposite direction and meeting him at the point where he is to pass the persons or vehicle overtaken. Any person shall at the intersection of public highways keep to the right of the intersection of the centres of such highways when turning to the right and pass to the right intersection when turning to the left. Every driver or operator of a vehicle approaching the intersection of a street or public highway shall grant the right of way of such intersection to any vehicle approaching from his right, providing that traffic officers at such intersection may direct traffic.

Civil Actions.

Another important provision of the law is concerning civil actions. In civil actions if motorists injure persons or property in violating the rules of the road, the court may grant double or treble damages with the costs if the complaint is maintained. This means a \$3000 loss instead of a \$1000 loss if you are found violating the rules, or if a man is hurt to the extent of \$10,000 worth the court may grant him \$30,000.

Failure of an Officer to Report Violations.

If any officer fails to report violations of the law to the proper prosecuting officer and a motorist knows of it, he may sue him within 90 days and get a \$10 judgment.

Mirrors or Reflectors.

Every vehicle so constructed that the driver or operator is prevented from having a constantly free and unobstructed view of highway to rear and at the sides of the same, shall be equipped with a mirror or reflector attached to and so located and adjusted on such vehicle as to give the operator thereof a clear reflected view on the highway to the rear of such vehicle. That means business to all, automobiles as well as lumber wagons. The penalty for the violation of this section is a fine of not less than \$5 nor more than \$25 for each offense.

NEW HAVEN RULES.

NEW HAVEN, CONN. The Board of Aldermen of this city have just adopted the following ordinances relative to one-way traffic and parking places: "No vehicle shall be allowed to remain standing for more than 15 minutes on Church street between Chapel and Court streets, and no vehicle shall be allowed to remain standing for more than 15 minutes on Church street between George and Chapel streets, nor on Church street between Court and Elm street; on the east side of Church street, between Court and Elm streets; or on Chapel street, be-

tween York and State streets. No vehicle shall be allowed to remain standing for more than one-half hour between 8 o'clock in the forenoon and 7 o'clock in the afternoon on Crown street, between State and College streets; on Center street, between Orange and Temple streets; on Court street, between State and Church streets; on Temple street, between Chapel street and Congress avenue; on Gregson street, between Chapel and Crown streets; or on Orange street, between Elm and Crown streets; provided that this section shall not apply to any vehicle while the same is being loaded or unloaded with goods or merchandise, but in such case such loading or unloading shall be done with dispatch and not in an unreasonable manner.

Section 828—The following places are hereby designated as parking places for vehicles in the city of New Haven, viz.: Elm street, on the southerly side, between Church street and College street; Church street on the west side for a distance of about 300 feet north of Elm street; Church street on the westerly side, between Court and Elm streets; and College street on the east side, between Chapel and Elm streets. Any vehicle may be parked or allowed to remain standing at said places between 8 o'clock in the forenoon and 8 o'clock in the afternoon, except for a period of not over two hours, and every such vehicle shall be placed at an angle about 45 degrees with the side of the street, except on College street, and where cars shall be parked parallel with the curb and as close thereto as practical, and shall be headed with the direction of traffic on the side of the street on which it is placed. Except as herein provided no vehicle shall be parked at any of said places in said city.

Section 832. The following named parts of streets in the city of New Haven are hereby designated and declared to be one-way streets and no per-

son shall lead, ride or drive any animal, nor shall drive or propel any vehicle on, along or over said parts of streets in any direction except as hereinafter provided, viz.: Court street, between State street and Church street, on which all traffic shall go westerly; Center street, between Temple street and Orange street, on which all traffic shall go easterly; Gregson street, between Crown street and Chapel street, on which all traffic shall go northerly; any vehicle may stop on either side of any part of said one-way streets except as provided in section 326 of these ordinances, but such vehicle shall stop headed with the direction of traffic and close to the curb, provided that section 820 of these ordinances shall not apply to any vehicle stopping in any one-way street under the provisions of this section.

Section 832½. No cars shall park on Temple street between Chapel street and Congress avenue, or on Center street, between Temple and Orange streets, except on one side of the street. Cars shall be parked on alternate sides of the street on alternate months, as follows: On the east side of Temple street, beginning Sept. 1, 1917, and continuing thereon until Sept. 30, 1917, when said cars shall be parked on the west side of Center street beginning Sept. 1, 1917, and continuing thereon until Sept. 30, 1917, when said cars shall be parked on the south side of the street from Oct. 1, 1917, until Oct. 31, 1917. Thereafter cars shall be parked alternate months and on alternate sides in the same manner as above, provided this shall not apply to any vehicle, while the same is being loaded or unloaded on either side of the street.

The police are ordered to place the proper markers in their proper places according to the inclosed ordinances.

The board also passed the ordinance prohibiting vehicles from standing on Temple street, between Chapel and Elm streets.

WHITE LIGHTS IN NEW JERSEY

New Law Makes Yellow Lenses Illegal

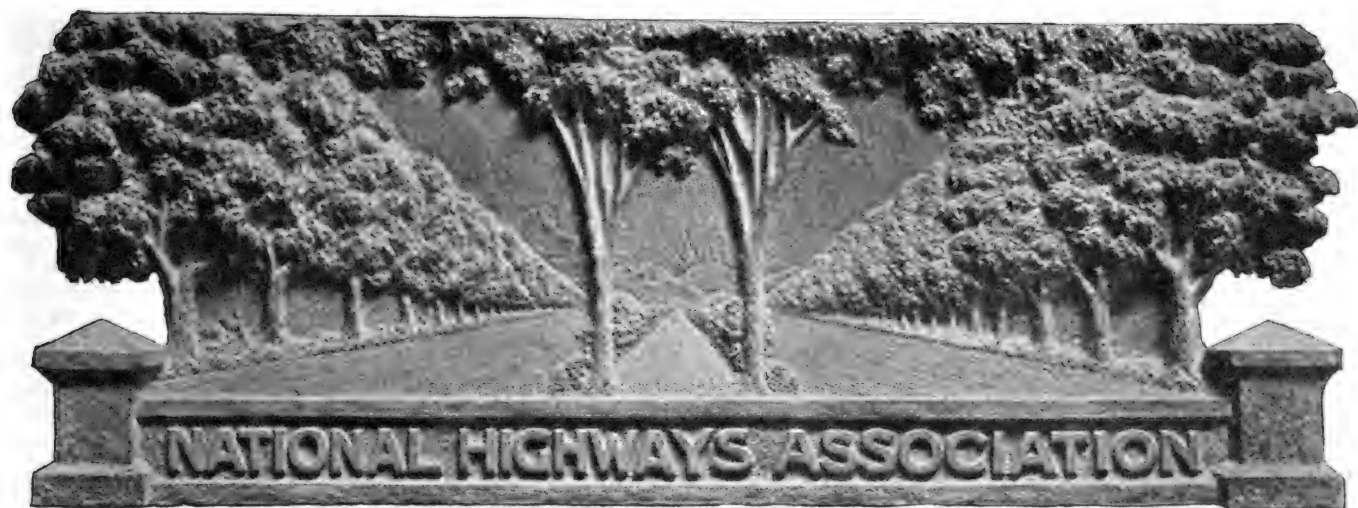
New Jersey has a new law calling for white lights, and the use of yellow lenses in that state has been declared illegal. It is stated, however, to be permissible for a non-resident of New Jersey who is in the state for a few days only, to use the yellow lenses. If, however, the motorist is to remain in the state longer than a few days clear lenses must be substituted for the yellow ones.

The motor vehicle commissioner of the State of New Jersey states: "We are perfectly willing to permit foreign registered cars to travel through New Jersey without the necessity of the removal of the amber colored lens. If, however, the foreign registered car is to remain in the state for a period of time, then we must insist that an approved lens be used. Our law specifically states that the light shall be a white light and we must object to

the approval of any lens designed to eliminate the dazzle and glare so long as it is made in color. If an automobile owner has no intention of remaining in New Jersey he can travel through the state without fear of arrest."

NEW HAMPSHIRE SPEED LAWS.

The public service commission is calling attention to the motoring public of the law passed by the 1917 session of the Legislature requiring the reduction of the speed of motor vehicles to 10 miles an hour on approaching railroad crossings. All towns have erected beside all highways, within 400 feet of every grade crossing, signs calling attention to location of such crossing. It is claimed that if the law is complied with there will be no excuse for accidents at any of the grade crossings.



Review of Four Years of Association Work

Nine Thousand Copies of Literature Issued a Day Estimated to Reach 2,000,000 People—Statistics of Work Shop and Library

SOME of the great educational work in which the National Highways Association is engaged may be gleaned from the following statement of the association's activities:

The fourth year of the work of this association ended on March 9, 1917, and a summary of the operations during these four years is as follows:

1. The numbers of different editions of maps, pamphlets, bulletins, circulars, etc., issued by the association amount to:

1913, 214; average per week, 4.
1914, 158; average per week, 3.
1915, 217; average per week, 4.
1916, 4,165,113; average per day, 14,000.
Total, 790; average per week, 4.

2. Total known editions of these different maps, pamphlets, bulletins, circulars, etc., enumerated above, of which the association has been able to obtain a record are:

1913, 3,306,113; average per day, 11,000.
1914, 672,401; average per day, 2200.
1915, 2,162,449; average per day, 7200.
1916, 4,165,113; average per day, 14,000.
Total, 10,306,076; average per day, 9000.

3. The total possible maximum editions of these maps, pamphlets, bulletins, circulars, etc. The record of these it is impossible for us to obtain, as many recipients will not make a return even though publishing the matter forwarded to them. The observer can take any percentage he thinks fair to arrive at the probable audience of the literature issued by the National Highways Association.

1913, 550,900,607; average per day, 1,800,000.
1914, 76,138,651; average per day, 250,000.
1915, 236,275,499; average per day, 800,000.
1916, complete record not kept over 1,000,000,000; average per day, 4,000,000.
Total, complete record not kept over 2,000,000,000; average per day, 2,000,000.

4. Total communications sent out, received and answered in correspondence department at "work shop" and executive offices only. This does not include national headquarters, New York, Washington offices, or any of the 200 departments and divisions of the association.

1913, 109,416; average per day, 365.
1914, 51,550; average per day, 171.
1915, 68,912; average per day, 229.
1916, 596,535; average per day, 1988.
Total, 826,413; average per day, 688.

5. Pieces of stationery purchased for the use of the association during this period:

1913, 1,273,400; average per day, 4245.
1914, 364,577; average per day, 1215.
1915, 300,000; average per day, 1000.
1916, 1,126,966; average per day, 3756.
Total, 3,124,943; average per day, 2604.

In addition to the above work the library of the National Highways Association (said to be the most complete in this or any other country) at Columbia University, has been maintained up to date and very large additions thereto have been collected at our South Yarmouth workshop. The Du Pont-Davis Road Photograph Competition, together with many other additions, has given the association a remarkably fine and probably the largest collection of road photographs in the country. To these will be added the photographing of America, now being done, and which will take about two years. This work is undertaken under the auspices of the association in co-operation with the Department of the Interior and the Combition Pictures Corporation and Pathe Exchange, Inc. The mapping of the United States, occupying the last four years, is nearing completion, and the U. S. tour book of the association will be likely to be pub-

lished during 1918. The association now has over one hundred and twenty-five (125) state, national and alignment good roads organizations affiliated with and acting as departments and divisions thereof. We have seventy (70) divisions organized in our council of national advisors. They represent many social and industrial activities of the body politic, and in their personnel include many "men of recognized ability and eminence in the arts, sciences and letters." Our council of governors and council of commissioners now represent every state in the Union.

MONTREAL-OTTAWA.

Motorists touring between Montreal and Ottawa are advised to go via Malone, N. Y., to Ogdensburg, crossing the ferry to Prescott and over a fair country road to Ottawa.

ROAD CONSTRUCTION.

The Berlin turnpike to Meriden, Conn., is now open.

The road from Greenfield to Shelburne Falls and north to Keene, N. H., is in good condition.

From Sheffield to Pittsfield via Jacobs Ladder is also in good condition; but between Pittsfield and Albany there is a bad detour.

From Saybrook, Conn., to New Haven via Middletown the highway is in good condition; but between Enfield and Warehouse Point the road is still torn up.

On the road from New Haven to New York there is a bad detour lying between Bridgeport and Milford.

Between Boston and Worcester there is a bad stretch of road at Shrewsbury.

The road between Providence and Springfield via Palmer and Southbridge contains a bad detour between Southbridge and Webster.

Some Police Activities in Eastern States

CLINTON, MASS. The police of this town have been ordered to enforce the speed laws on High and other streets.

GLOUCESTER, MASS. Considerable complaint is being made against fast driving of motor vehicles in the city of Gloucester and the police have been ordered to strictly enforce the law.

FOREST HILLS, MASS. The police of the Jamaica Plain station are arresting motorists who fail to observe the orders or instructions on the sign attached to the elevated structure which directs motorists to go to the right.

LYNN, MASS. The police are arresting motorists who approach street cars nearer than eight feet.

WORCESTER, MASS. Owing to numerous complaints received of fast and reckless driving of motor cars along Milbury street, Quinsigamond, the speed laws have been ordered strictly enforced.

LONGMEADOW, MASS. A campaign has been begun against fast driving of automobiles through this town and also against the opening of muffler cutouts. A number of arrests have already been made.

NEWBURYPORT TURNPIKE. So many accidents have occurred and such fast driving has been indulged in on this turnpike between Danvers Highlands and Topsfield as is likely to compel the stationing of officers thereon to secure a compliance of the law.

MARLBORO, MASS. The police authorities are making arrests of violators not only of the state laws, but all new traffic regulations recently adopted by the city council. Much complaint is heard against parking cars on the main streets all night and all day, and in certain cases cars standing in front of stores are being washed in the streets.

SWAMPSCOTT, MASS. The police are arresting overspeeding motorists on Paradise road—the main state highway between Swampscott and Salem. Motorcycle police are patrolling this road between the railroad bridge and Burrill street; also on Humphrey street.

IPSWICH, MASS. The police of this town are making arrests of overspeeders.

BEVERLY, MASS. The police of this city are making many arrests of overspeeding motorists not only during the day, but during the night time, in the vicinity of the North Beverly station on the main state highway running from Beverly to Gloucester.

DRUNKEN DRIVERS IN MASSACHUSETTS.

A vigorous campaign for the elimination of drunken and reckless operators who show insufficient regard for the safety of the public has been determined upon by the Massachusetts Highway Commission and will be put into operation at the earliest possible moment. A number of new investigators have been appointed and it is expected that they will soon begin the performance of their duties.

The new rule of the Massachusetts

Bulletins of New Traffic Rules and Notice of Speed Traps Being Operated in a Large Number of Cities

Highway Commission is likely to have good effect. Hereafter a man convicted of running a car in Massachusetts while he is under the influence of liquor must not only take the pledge and keep it for a year, but he must obtain a position with a respectable employer and so generally conduct himself for a year that the employer will be willing to give him an indorsement of his conduct to the Highway Commission; then, if all things are equal his operator's license will be returned to him. A second conviction, however, will doubtless make it next to impossible for him to obtain a license again.

NEW YORK SPEED TRAPS.

Speed traps in various municipalities in northern and central New York have been established and many arrests are being made in Jefferson county of motorists who drive through the municipalities at a speed exceeding 15 miles per hour.

ELMIRA, N. Y. The police department of this city has ordered a strict enforcement of the new state wide traffic law.

NIAGARA FALLS, N. Y. The highway laws are being strictly enforced by the police of this city. Motorcycle police are making many arrests.

IN RHODE ISLAND.

WOONSOCKET, R. I. The police of this city are holding up motorists for violation of the motor vehicle automobile laws, ordering them to appear at the police station for the purpose of full identification, and while no arrests have been made the offenders are given to understand that any further violation of the law means prosecution.

NARRAGANSETT PIER, R. I. Automobile laws with respect to speeding, careless driving and the proper display of lights have been ordered strictly enforced by the chief of police of this town.

MAINE SPEED TRAPS.

A revival of speed traps is taking place in many of the cities in Maine: South Portland, Scarborough, Gray, between Biddeford and Portland, and between Portland and Poland Springs, near Dry Mills and Rockland.

A great deal of complaint is heard on every hand by non-resident motorists of Maine against the unjust discrimination in these arrests. We alluded to this matter in a previous issue of this journal, but there seems to be little, if any, abatement of the despicable methods adopted by the police patrolling many of the Maine highways. The following is a sample of numerous complaints: "I had been following a Maine car for several miles," said a non-resident tourist, "when out from the side of the road jumps a sheriff and his deputy, holding me up, charging me with violating the law and

there was nothing for me to do but to furnish bail for the appearance of my chauffeur in court on the following morning. Strange as it may seem there was a bail commissioner right on hand, who received \$5 to allow our party to proceed to the railroad station. We boarded a train leaving Maine, but our chauffeur was obliged to remain behind. The first thought was to fight the case, but upon reflection this would necessitate a greater expenditure of money, a loss of pleasure and a consumption of considerable time. There was little to do, however, but to hold up our hands and let the authorities pick our pockets."

CONNECTICUT.

BRIDGEPORT, CONN. Considerable complaint is being heard against the fast and reckless driving of automobiles in various parts of this city and a strict enforcement of the law has been ordered.

NEW HAVEN, CONN. A complaint has already been made relative to the fast driving of cars on the fine new driveway through Edgewood Park, along the east bank of the West river, extending from Chapel street to Whalley avenue, in Westville. This road has been about four years in building and is considered a very fine stretch.

STAMFORD, CONN. "Stop" and "Go" signals are to be placed at Atlantic square and at Main and Pacific streets.

WILLIMANTIC, CONN. The police have been ordered to arrest all motorists driving at an unreasonable rate of speed on lower Main street and West Main street, in this city.

JAY WALKERS.

"Stop Jay Walking." That is one of the orders to the police of Kansas City, says the Worcester Telegram. A jay walker is one who walks across a street at the right place, but at the wrong time or across a street on the bias or at the wrong place at any time. Then a jay walker is one who pays no attention to anybody else or to his own safety in crowded thoroughfares. The automobile is the last straw which established odium for the jay walker. But other vehicles help the autos crowd the streets. They have the anti-jay walker fever so hard in Kansas City that the chief of police has ordered the officers to give the jays only a week more to reform under special instructions, and then arrest them for disturbing the peace.

The officers say they have the most trouble with women of age, because they persist in going wrong in the crowded streets, and they give all observers heart failure to such an extent that it is next to impossible to regulate the traffic. And the busy man is the next most persistent nuisance. He goes any way to get across and it is not enough that he generally goes safely. There is always the doubt and it confuses other pedestrians and the people riding as well as the traffic officers.

Two Popular Tours Out of Historic Boston

ONE of the most delightful and interesting motoring trips in the eastern part of the states is that from Boston to Greenfield, to North Adams, over the Mohawk Trail; thence south to Pittsfield, through the Berkshires to Springfield and back to Boston via Worcester. We are presenting here-with a detailed description of this tour:

BOSTON TO GREENFIELD. 99 Miles.

State Road All the Way.
(Follow Red Banded Poles.)

From Boston run out over Harvard bridge to Cambridge, curving right around Harvard on Massachusetts avenue. Keep left at fork and go over railroad.

- 6.9 ARLINGTON.
- 8.6 ARLINGTON HEIGHTS.
- 12.0 LEXINGTON. Curve left, away from trolley. Left at fork on Lincoln avenue. Right at fork on the Lexington road. Left at next fork and right at three corners.
- 18.6 CONCORD. Join trolley. Right at fork, away from trolley. Right at fork on Elm street. Fork, curve right to
- 25.4 NORTH ACTON.
- 28.4 LITTLETON COMMON. Left at fork. Right at library. Pass cemetery and at fork keep left and right at next fork. Go over railroad. Curve right at fork over bridge into
- 25.0 AYER. Take right hand road beyond railroad, leaving trolley. Turn left. Fork, keep left, over railroad. Go over bridge and keep right at fork. Right at next forks to
- 43.6 LUNENBURG. Water trough, right, into Main St.
- 47.7 FITCHBURG. Water trough, left, into River street. Left at irregular four corners, under bridge.
- 51.0 CROCKERVILLE. Water trough, right. End of road, right.
- 55.0 WESTMINSTER. Straight ahead. Left at fork.
- 58.7 SOUTH GARDNER. Right with tracks at water trough.
- 59.3 GARDNER. Left beyond railroad bridge. Left onto Main St.
- 60.6 W. GARDNER. Left on Parker St. Right on West St.
- 63.9 OTTER RIVER.
- 65.2 BALDWINVILLE. Left at end of road. Water trough, right on Maple St. Left, over bridge.
- 74.8 ATHOL. Left at fork into School St. Left at end of street on to Mystic St.
- 74.7 ATHOL. Cross iron bridge, curve left at three corners and go over two railroads.
- 79.5 ORANGE. Straight on.
- 84.6 ERVING. Keep left at fork. Left at end of road. Left at four corners.
- 91.0 MILLER'S FALLS. Right at four corners. Right at fork and right at end of street. Right hand road.
- 95.5 TURNER'S FALLS. Left at end of road. Right hand road. Water trough, left into High St. Right on Main St.
- 99.0 GREENFIELD.

GREENFIELD TO NORTH ADAMS. 36.7 Miles.

- 0.0 GREENFIELD. Main St. Run west and at water trough curve left over bridge. Four corners, right.
- 5.1 SHELBURNE. Right at fork. Left hand road.
- 9.1 SHELBURNE FALLS. Right at end of road. Right at fork and left at next fork. Right hand road.
- 17.7 CHARLEMONT. Right hand road. Mohawk Trail parts.
- 29.3 WHITCOMB SUMMIT. Down grade and then turn left. Meet trolley and curve left.

One is Through Beautiful Country Over the Mohawk Trail—Another Out the Old Newburyport Turnpike

- 26.5 Right hand road. End of same, left on Eagle St. Right at four corners into Main St.
- 36.7 NORTH ADAMS.

NORTH ADAMS TO PITTSFIELD. 22 Miles.

- 0.0 NORTH ADAMS. Right on Ashland St., with trolley under railroad. Pass cemetery. Trolley leaves. Right over tracks. At waiting station meet trolley and turn square left. At four corners turn left. Trolley.
- 7.5 ADAMS. Curve slightly left on Main St., following trolley. Go over railroad and small bridge. Then turn right with trolley on Commercial St. Bear right over bridge. Trolley goes left and comes in again.
- 12.0 CHESHIRE. At fork, curve left, away and over trolley. Go over railroad and bridge, meeting trolley from right. Go over railroad. Trolley goes left. Go by Berkshire postoffice. Bear left down hill. End of road, right, on macadam. At four corners, right, following trolley. Go over railroad bridge. Water trough, right, with trolley. Hospital ahead, turn left on North St. with tracks to
- 22.0 PITTSFIELD.

PITTSFIELD TO SPRINGFIELD. 56 Miles.

- 0.0 PITTSFIELD. Run south with tracks on South St. Right at fork.
- 6.6 LENOX. Square left at monument. Left at stone church. At fork curve right on fine macadam. End of road, turn left, over bridge. Water trough, turn right and follow trolley.
- 11.0 LEE. Left at end of street with trolley. Take right hand road, following trolley. Left at fork.
- 13.0 E. LEE. Straight ahead. Jacob's Ladder commences.
- 24.0 BONNYRIGG FOUR CORNERS.
- 28.0 CHESTER. End of road, turn left. Turn left under railroad and right beyond.
- 35.0 HUNTINGTON.
- 39.0 RUSSELL. Wooden church, turn right.
- 41.5 WORONOCO. Franklin St. At the end of street (large elm), right on Elm St.
- 47.0 WESTFIELD. Square left on Main St. with branch trolley. Left at fork. Three corners, right, meeting trolley. Right at fork, bearing left into W. SPRINGFIELD. End of street, right with tracks on Elm St. Square left at four corners.
- 54.4
- 56.0 SPRINGFIELD.

SPRINGFIELD TO WORCESTER. 51 Miles.

- 0.0 SPRINGFIELD. Railroad arch. Run south on Main St. Masonic Temple. Left with trolley on State St. Water trough, curve left. Fork at cemetery, curve right.
- 10.0 NORTH WILBRAHAM. Caution. Left under railroad and at once square right.
- 15.5 PALMER. Square left on Thorndike St. Sharp right on Park St.
- 24.6 WEST WARREN. Three corners, right, down hill.
- 27.0 WARREN. Right. Irregular four corners, left, following trolley. Curve left over narrow bridge, bearing right over bridge. Right at end of road. Left with branch trolley.
- 30.6 WEST BROOKFIELD. Right with branch trolley. Right at fork.
- 33.2 BROOKFIELD. Inn, turn right. End of road, left, following trolley.
- 36.2 EAST BROOKFIELD. Right at fork.

- 40.0 SPENCER. Right at fork and bear left down hill to
- 45.0 LEICESTER. Straight on to
- 47.0 CHERRY VALLEY.
- 51.0 WORCESTER.

WORCESTER TO BOSTON. 43½ Miles.

- 0.0 WORCESTER. Southeast on Front St. Washington square, straight through following branch trolley. Fork, left on Shrewsbury St., curving right into Belmont St. Water trough, left, following tracks.
- 5.5 SHREWSBURY. Left at fork.
- 10.0 NORTHBORO. Water trough. Right, following trolley, over railroad at station. Go straight ahead when trolley leaves. Left at end of road into W. Main St.
- 15.7 MARLBORO. Curve right into Main St. Left at fork, with tracks. Water trough, right on macadam. Turn right at three corners.
- 23.0 SOUTH SUDBURY. Right at fork.
- 26.5 WAYLAND.
- 29.8 WESTON. Right at water trough and immediately right on School St. Curve slightly right into Wellesley St. Left, Newton St. Diagonal four corners, left on Commonwealth Ave., which follow through.
- 34.0 AUBURNDALE.
- 37.0 NEWTON.
- 41.0 BROOKLINE to
- 43.4 BOSTON.

A PICTURESQUE HIGHWAY.

One of the most unique as well as one of the most picturesque highways in Massachusetts, if not in all New England, is the old historic Newburyport turnpike. This highway runs straight across the country from Everett to Newburyport, up hill and down dale, through most beautiful rural scenery, still avoiding all industrial centres. If it were a macadam road this highway might easily suggest one of the splendid highways in France, at least with regard to its straightness and attractive contiguous country. It is a good dirt road, however, very comfortable for motoring, and is the most direct road from Boston to Newburyport and Portsmouth.

It is hoped that the time may be not far distant when we shall see this turnpike one of our great boulevards connecting Boston with the seashores of New Hampshire and Maine.

The following is a more or less detailed description of this highway:

BOSTON TO NEWBURYPORT. (36 Miles.)

Macadam and Gravel Road.

- 0.0 BOSTON. Run out over Harvard bridge to Cambridgeport. Right on Columbia street, away from trolley. Meet trolley. Left on Broadway. Four corners, right on Prospect street. Five corners, meet trolley, left on Webster avenue. Go over bridge into
- 3.2 SOMERVILLE. Straight ahead. Church, turn right up hill. Walnut street. Go over bridge and cross Broadway. Middlesex Fells Parkway. Go over drawbridge.
- 5.2 MEDFORD. Right on Revere Beach Parkway. Go over bridge and drawbridge.
- 6.3 EVERETT. Left on Broadway and keep left. Go over Main street trolley.
- 14.8 LYNNFIELD. Straight ahead. Go over three railroads and bridge. Go over two railroads—State street. Straight ahead through four corners.
- 36.0 NEWBURYPORT.

SHOP HINT IN TRACING BOARD

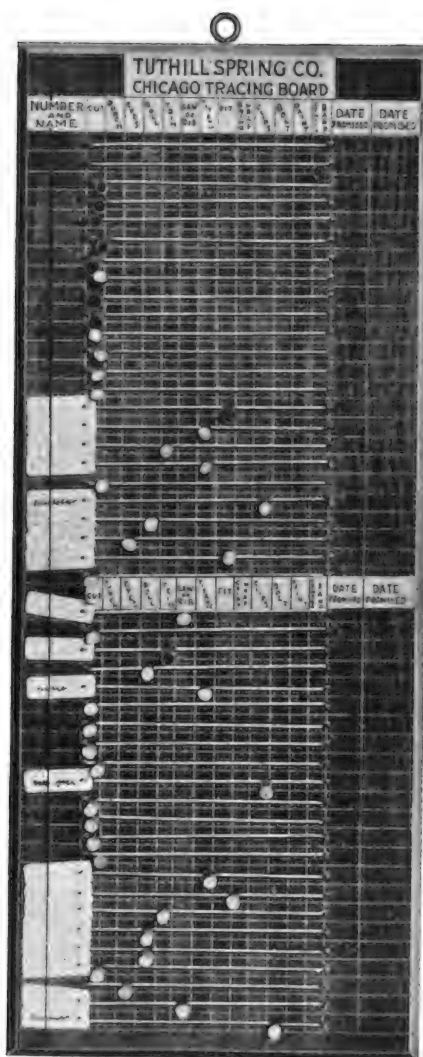
Short Cut on Record of Work Evolved by an Automobile Spring Manufacturer

ONE of the undertakings of the Tuthill Spring Company, Chicago, Ill., manufacturer of a well known automobile accessory points a shop efficiency hint to some garage and automobile repairing lines, no less than to manufacturers. By a clever adaptation of the efficiency idea that lies in sticking a pin in a military map, or in a sales map for that matter, an engineer of the company has by the invention of a tracing board produced an advanced method of keeping tabs on orders, so that delays are noticed, the causes discovered and deliveries made on time. While the graphical way has been the quickest method of imparting information since the beginning of the world, this tracing board makes a clever adaptation of this good old idea. This device was originated by Harold T. Moore, an engineer of the company, trained in the working out of short manufacturing cuts.

As shown in the accompanying illustration, the tracing system is incorporated on a specially laid out board and eliminates the use of a card index. It has many advantageous features as compared with the card system of tracing orders through a factory or shop, a fact which the company recognized soon after it was put in service.

Formerly the records were kept on a card index, but the board has proved itself to be far superior method of caring for the orders. The entry clerk who has charge of the board can bring his tracing board up to date in much shorter time than it took to make the card records. It also saves time for officials in charge of the work or on inspection, as the superintendent at a slight glance can determine the exact status of each job without poring over a big index and getting a report on only one job at a time.

If there are 20 or more jobs underway at a time the superintendent can become informed as to the state of their completion by running his eye down the board, which is ruled off with the name of the order set in the horizontal space and with corresponding spaces on the opposite side of the board for the date promised. In the perpendicular columns, each of which is labeled with some name designating the various stages of the process or work that the job must go through, pegs are inserted to indicate how far the job has progressed. The indicator will be pegged by means of an elastic guide in the space corresponding to the department which has last received the job. In the Tuthill works these several departments are indicated by the mechanical treatments, which are as follows: Cut, punch, eyes, roll, trim, saw or rib, Titanic, fit, grind, wrap, clips, bolt, paint, centre, band. The system has effected many savings.



PACKARD WITH AVIATION MOTOR MAKES NEW RECORDS.

All existing two-mile automobile records went by the board last week at Sheepshead Bay and a new unofficial record for 10 miles was established. The new speed king is a Packard, equipped with a 12-cylinder aviation motor with 905 cubic inches displacement. It was driven by William Rader and his performance was more remarkable in view of the fact that on one stretch of the course had to proceed against a stiff wind.

The record established for two miles was 58.2 seconds, or at the rate of 123.88 miles per hour. The previous record of 58.99 was held by Hornsted in a Benz car and was made at the Brooklands track in England on June 24, 1914. The previous American record of 1:10 was made by Barney Oldfield at Tacoma, Wash., in a Christie car, July 5, 1915.

Rader's record for 10 miles, which is unofficial, was 4:55.8, and compares with

5:19.78, the former world's record held by Hornsted and made at Brooklands, Jan. 14, 1914, in a Benz. Aitken held the American record for the distance, which was made in a Peugeot at Sheepshead Bay last September, when he went 10 miles in 5:45.

MADE 37,482 MILES ON AJAX TIRES IN CONTEST.

The winner of the fourth annual tire mileage contest of the Ajax Rubber Co., Fred Weltzman of Brooklyn, N. Y., covered 37,482 miles, as compared with 27,220, the high mileage in last year's contest.

The first 50 winners in the contest showed an average mileage of 15,000, while the first eight averaged over 30,000 miles. The second prize was won by Joseph Schoenbaum of New York with 33,072 miles.

PIKES PEAK HIGHWAY ROUTE IN ILLINOIS.

In the itinerary of the Pikes Peak Highway, on the Illinois division, between the cities of Jacksonville and Hannibal, Mo., published in the annual touring number of the Automobile Journal, June 10, a detour route was given, running through Beardstown, Clayton and Quincy. This route is not a part of the official Pikes Peak Highway, which runs through Markham, Griggsville and Barry to Hannibal. Along this section there has been a large amount of improvement work accomplished, including grading and construction of permanent culvert. Last fall a road was constructed to the Illinois river, enabling the ferry to land at any stage of the river.

CONTINENTAL TO OPEN SERVICE DEPOTS.

The Continental Motors Corp., Detroit, Mich., makers of the Continental motor, which is used in a large number of the leading pleasure cars and motor vehicles manufactured in this country, is planning the establishment of a number of service depots in the prominent cities for the sale of parts.

The first of these stations will be located at Philadelphia, Chicago, Kansas City, Boston and Indianapolis. They will all carry a full line of parts for Continental motors, insuring prompt delivery to distributors, dealers and owners of cars which are equipped with this motor. This plan will not only relieve the distributor and dealer from carrying a large stock of parts, but will prove a valuable factor to the manufacturer in influencing purchases of his car.

DAY-ELDER MOTORS DIVIDEND.

The Day-Elder Motors Corp. has declared a semi-annual dividend of four per cent. on its preferred stock, payable to stockholders of record June 30, 1917, on Aug. 1.



TRANSMISSION LINING.

There are few things as uncomfortable as a grabbing clutch, or a harshly engaging brake band. The Ford low speed clutch, reverse and service brake action is dependent upon contracting bands, which must be lined with some sort of fabric to make them efficient. For this purpose the Advance cork insert transmission lining has been designed. It is made up of a tough fabric into which are inserted pieces of cork. The manufacturers claim that when a car is fitted with this type of lining the clutch, as well as the service brake, engages smoothly and with a velvet action, due to the soft frictional bearing of the cork inserts.

Manufactured by Advance Automobile Accessories Corp., Dept. G 3-1, 56 East Randolph St., Chicago, Ill. Write for prices.

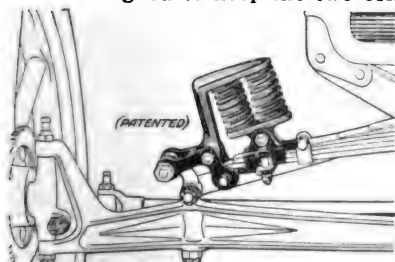
COMBINATION TESTER.

A handy all around testing device for the repair man and accessory dealer, as well as the individual, is illustrated. It is designed for testing spark plugs, single or double contact lamp bulbs, horns, or for locating general electrical troubles. There are two types, the first for attachment to alternating current lighting circuits, and the second for battery attachment. In either case lamps of any candle power or voltage, spark plugs of any length, or electric horns of any voltage can be tested.

Manufactured by Jefferson Electric Mfg. Co., 426-430 South Green St., Chicago, Ill. Price upon request.

CHAMPION SHOCK ABSORBER.

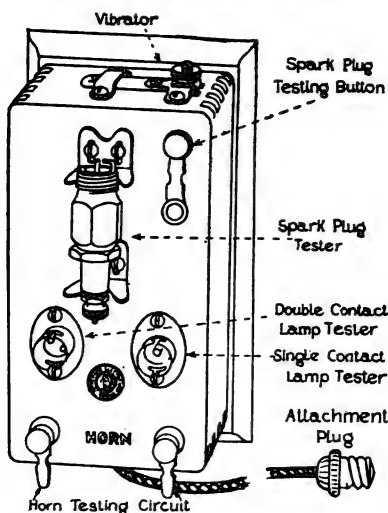
The Champion shock absorber is designed primarily for Ford cars and consists of two coiled springs between a rocking member and a lever arrangement. The special feature of this device is the particular spring mounting, which is designed to keep the two coiled



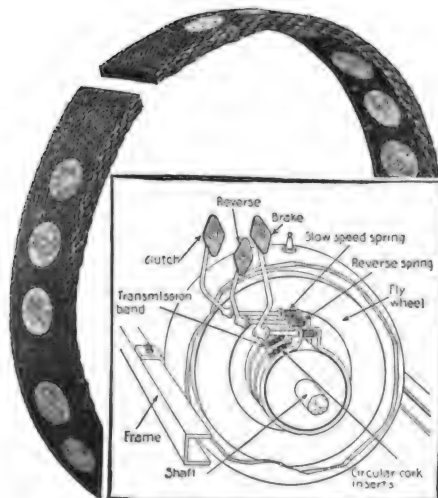
Champion Shock Absorber.



Anti-Rattle Door Check.



Combination Tester.



Illustrating Use of Transmission Lining.

springs under tension at all times, thus adding to the flexibility of the suspension. A study of the sketch shows that side sway as well as road shocks are absorbed by the dual springs.

Manufactured by Champion Shock Absorber Sales Co., Inc., Indianapolis, Ind. Price \$15 per set of four.

FORD ANTI-RATTLE DOOR CHECK.

Every motorist of experience is greatly annoyed when squeaks or rattles develop on his car. A common cause for rattle is found in the doors, which are bound to work loose sooner or later. The Mosco anti-rattling door check for Ford cars is a little device, which is made of the exact size of the regular Ford door catch and is used in place of it. When applied to the door frame in place of the regulation catch they provide a sure means for silencing the rattle of the doors. As shown in the illustration the flat spring at the back of the catch provides a resilient buffer against which the door has a bearing.

Manufactured by the Motor Specialties Co., Waltham, Mass. Price \$1.25 per set of three, or 50 cents each.

OAKES KRANKLOCK.

This is a practical accessory for Ford cars at a low price, combining a license bracket and crank holder with a lock. It holds the license in the logical place. The plate is readily put into place and is held securely by lock washers. Extending from the top of the device are two short arms by which the crank is held rigidly, eliminating rattles and keeping it out of the dirt. Through these arms may be inserted a tumbler lock, which is provided with two keys. The device is easily installed, in a short time, strong, neat and durable, made of pressed steel and finished in black enamel.

Manufactured by the Oakes Co., Indianapolis, Ind. Price complete with padlock, \$1. Without padlock, 50 cents each.

AD-EL-ITE CARBON REMOVER.

One of the most frequent troubles that assails the motorist today is the carbon evil. Loss of power, preignition and poor compression are three symptoms of this trouble. Ad-El-ite is a liquid carbon remover, which the makers say will effectually remove all of the carbon deposits from the combustion chamber. In using this liquid the engine is first run until it has thoroughly warmed up; the

spark plugs are then removed and about a tablespoonful of Ad-El-ite is poured into each cylinder. The engine is then allowed to stand for half an hour or over night, the spark plugs are again removed and the engine cranked over until the surplus vapor is ejected from the cylinders. Upon the replacing of the plugs and the starting of the engine the carbon is blown through the exhaust, in the form of vapor, or in chunks.

Manufactured by Adams & Elting Co., Chicago, Ill. Prices for 1/2 pint can, 50 cents; one pint, 85 cents; one quart, \$1.50.

GASCO ECONOMIZER.

Proper vaporization of fuel is a problem that is facing every automobile owner today. To get full power from an engine the mixing of gasoline and air in the proper proportions is necessary. The makers of the Gasco economizer claim that this device promotes vaporization, prevents back fire into carburetor and reduces carbon depositization. The Gasco economizer is a device which is attached to the intake manifold, between that part and the carburetor. It consists of three screens of copper gauze, in a cone shaped arrangement, one within the other. It is said that the gas mixture passing through the screen is thoroughly broken up, forming a fine vapor, which materially lessens the difficulty of starting the engine. A 30-day trial of the device is allowed and if not satisfactory it may be returned and money will be refunded.

Manufactured by the Gasket Supply Co., 18th and Ludlow Sts., Philadelphia, Pa. Price, \$1. Special proposition to dealers.

PERFECT CUT-OUT.

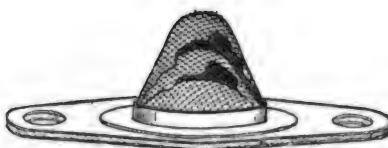
The Perfect Cut-Out is designed to be attached to the exhaust line and requires no fitting. The maker asserts that not only does it answer the purpose of a cut-out for enabling the detection of "missing" cylinders, but it may also be used as a coupling for attaching either a whistle or exhaust heater. The device is guaranteed to be positive in action and absolutely gas tight.

Manufactured by the Riverside Machine Works, New Castle, Penn. Prices from \$2.50 for 1 1/2 inch type to \$3 for two inch. Special dealers' proposition.

AUTOPOWER.

"How to keep the pull in your engine" is the title of an interesting little circular which tells of the product called Autopower. This product is guaranteed to remove carbon when mixed with gasoline, thereby removing one of the greatest of the problems of the motorists. For every 1200 miles traveled only one quart of Autopower need be used. Satisfaction is warranted by the manufacturers who issue a sight draft payable to any purchaser who is not satisfied with the product.

Manufactured by Autopower Division, the Crystal Oil and Paint Co., Cleveland, O. Price, \$1.50 a package.



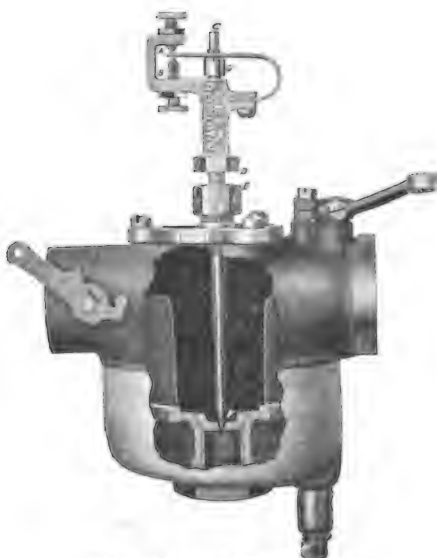
Gasco Economizer.



Sales Auto Glare Stopper.



Howe Searchlight Bracket.



Seek Thermo Regulator.

SALES AUTO GLARE STOPPER.

Every driver has at some time or other suffered the inconvenience and is aware of the danger, due to the excessive glare from the headlights of another automobile which is approaching. Some states in order to restrict the danger of accident resulting from the operator being blinded by this excessive light, have passed laws prohibiting the use of glaring headlights. The Sales Auto Glare Stopper is a simple device, consisting of a reel which may be attached to the top of the windshield. Upon this reel is carried a strip of colored celluloid, in a similar manner to which the ordinary window curtain is carried. At night the colored celluloid strip may be pulled out and fastened to the lower part of the windshield. Thus the blinding rays of the headlights are softened by the action of the celluloid and accidents are prevented.

Manufactured by Sales Publicity Co., 25 Carlton Court building, Buffalo, N. Y. Price \$1.

SEEK THERMO REGULATOR.

Every automobile owner has learned that though a rich mixture is necessary for starting, the gasoline may be partially turned off after the engine has "warmed up." Then again the faster the engine runs the greater the amount of heat generated and the less fuel is required in proportion. With these two points in mind the designers of the thermo regulator have designed this device so that varying degrees of heat will raise or lower the needle valve, thereby admitting more or less gasoline into the mixture chamber. To apply the device it is only necessary to remove the needle valve of the carburetor and screw the device into place. After it is once adjusted the regulator automatically provides for a richer mixture for starting, and as the engine is warmed up the mixture is gradually made leaner.

Manufactured by Seek Mfg. Co., 224 South 24th St., Philadelphia, Pa. Price, \$5.

HOWE SEARCHLIGHT BRACKET.

Inasmuch as the idea behind the searchlight is the providing of a freely turning light, it is obvious that the bracket is of importance. One of the advantages of the Howe spotlight is its ingenious bracket arrangement. This bracket is of the universal joint type and both joints can be turned at the same time so that the lamp may be moved instantly at any angle, with but little effort. Although it may be moved easily, it is said that the lamp stays where it is directed until again moved because of the patented spring control. Two coil springs hold the two joints in a firm, even pressure, make it easy to turn, but hold it firmly wherever turned, unaffected by jars and vibration.

Manufactured by Howe Mfg. Co., Chicago, Ill. Write for prices and catalogue of lamps.

THE FOGGER.

The Fogger is an automatic device for introducing live steam into the fuel of internal combustion engines as a means to remedy the carbon deposit evil. It consists of a housing containing two chambers separated by a diaphragm. The upper chamber, which is termed the vacuum chamber, is connected with the intake manifold; the lower is connected with the water circulating system, and, through the exhaust manifold, with the intake. It is also fitted with drain cock and air intake connection. The vacuum, from the impulse of the engine acting on the diaphragm, opens and closes the needle valve by which the water is admitted. This operation allows water and air to be admitted from the chamber to the intake manifold, and pass through the heating pipe in the exhaust manifold, where the mixture is heated, producing steam.

Elimination of carbon deposit, saving of fuel through more perfect combustion and increased power are some of the advantages claimed for the device.

Manufactured by Motor Steam Generator Co., 417 Heed Bld., Philadelphia, Pa.

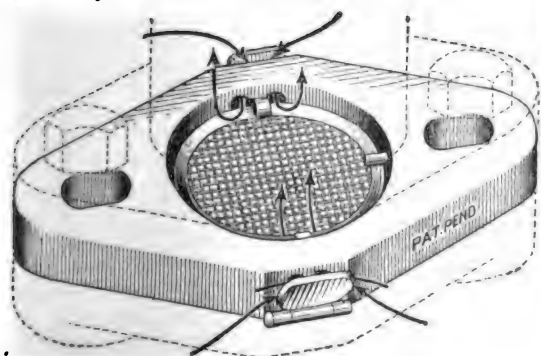
D. & D. SPARK PLUG.

A recent innovation and a radically different spark plug has just been placed on the market. This plug consists of a moving ball imprisoned in a slotted cage, and so designed that the ball is held at all times between the plug electrodes, but free to move or vibrate. Due to the varying compression and the movement of the piston the ball is in motion constantly as long as the engine is running, thereby keeping all of the sparking surfaces free and clean from carbon or soot. It is also claimed that the ball has a condensing or storing effect, thereby increasing the intensity of the spark and making the explosion stronger.

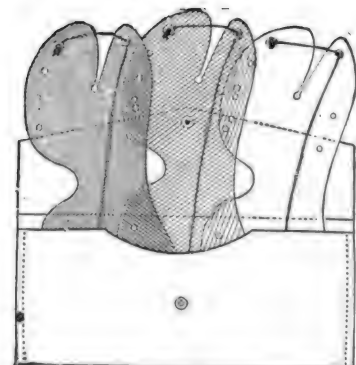
Manufactured by the D. & D. Co., 20 E. Jackson Blvd., Suite 810, Chicago, Ill. Price \$2 each.

FEATHERWEIGHT EYE PROTECTOR.

A convenient and clear vision eye protector with a number of practical points in its favor is illustrated. This device is made of a flexible material and after being worn a few times fits itself to the face, making it comfortable. It is fitted with adjustable elastic cords and is both



York Carburetor Perfector.



Featherweight Eye Protectors.



Vaporspray Attachment.

strong and sanitary, having no absorbent edges to catch the dirt. It may be conveniently carried in a hand bag with no danger of breaking. The device may be purchased in envelopes with two in the package or in a strong wallet as illustrated, containing three of assorted colors, white, amber and green.

Manufactured by Jay & Dee Specialty Co., 41 Park Row, New York. Price for envelope of two, 25 cents; wallet of three, 50 cents.



D. & D. Spark Plug.

THE VAPORSPRAY.

Every painter or enameler knows that for good results there is nothing better than the spray method of applying paint or enamel. With this method the paint can be applied evenly and smoothly, and when properly done has a glass finish that cannot be obtained with a brush. The Vaporspray is a scientifically designed apparatus for applying paint. This device is in effect a large air brush operating from pressure from 10 to 100 pounds. It is simple, for it has absolutely no adjustments to be made. The size of the spray is regulated by pressure exerted on the thumb button. The further the button is pushed in the faster the fluid will flow. Another appealing feature is the fact that the reservoir is an ordinary mason jar, which can be obtained at any hardware store, thus making it possible to use any number of jars which may contain various liquids.

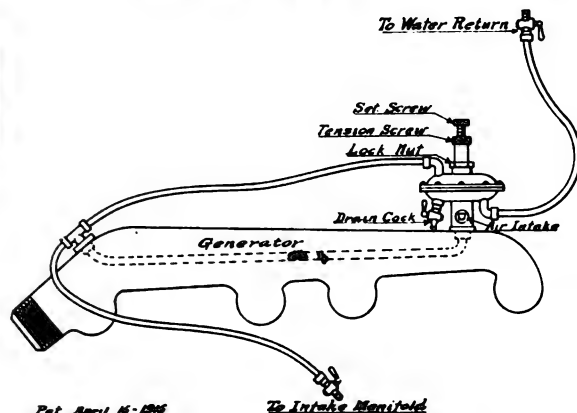
The equipment of the Vaporspray includes six feet of high pressure air hose with $\frac{1}{8}$ inch pipe size connections. It is guaranteed and sold under a 30-day trial with money refunded if not satisfactory.

Made by Vapor-Valve Co., 2820 N. Spring Ave., St. Louis, Mo. Price \$16.50.

YORK CARBURETOR PERFECTOR.

It has been scientifically proved that but a small percentage of the gasoline put into the tank is converted into useful power. The problem of a more efficient engine is troubling the engineers at the present time. The manufacturers of the York Carburetor Perfector claim a great saving in gasoline, and an increase of power when this device is used. The York carburetor perceptor is fitted to the joint between the carburetor and intake manifold, and has a screen incorporated which is designed to break up the gasoline particles. The rapid passage of gas causes two little valves to open in the sides of the device, admitting air, which is in proportion to the speed of the engine. As the engine is slowed down the gas passing through the manifold does not have such speed and, therefore, the valves are allowed to close.

Manufactured by York Carburetor and Auto Accessories Co., Inc., 680 Woodward Ave., Detroit, Mich.



The Fogger Applied.

NATHAN COMFYKIT.

A handy accessory for the traveling autoist, known as the Nathan comfykit, is made of olive drab two-ply waterproof auto cloth, when folded measures 9x5x2 $\frac{1}{4}$ inches, and weighs but 24 ounces. The Comfykit, which has specially designed pockets that hold each article in place, is also fitted with loops so that it may be hung up. The following items are contained in the kit: Sanitary wash cloth, card of safety pins, one safety razor, one rubber set collapsible shaving brush, one can of talcum powder and one shaving stick, and six-inch flexible comb, one military hair brush, one can Nathan foot ease, one steel mirror, one package extra buttons, one card of darning cotton and needles, one tooth brush with special guard, tooth paste, one case of zinc oxide adhesive plaster, one sewing outfit, one aluminum soap box and soap and an extra pocket for stationary, pencils, post cards, etc.

Manufactured by Nathan Novelty Mfg. Co., 84 Reade St., New York City. Price \$5.

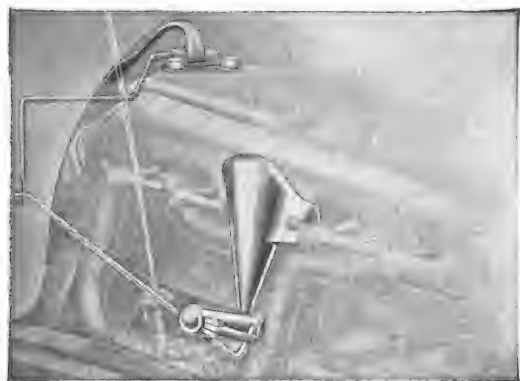
ANDERSON AUTO REEL LIGHT.

Capabilities as a spot light, a trouble light, or a pleasure light are the three features which are claimed for the auto-reel light. The lamp and bracket are finished in black enamel and fitted with a clear lens backed by 21 candlepower nitrogen bulb in a silvered parabolic reflector. The switch with "on" and "off" positions is located at the back of the lamp within easy reach. The lamp is mounted on a round housing, which contains 12 feet of extension cord wound upon a reel, and may be removed from the housing by turning the knurled nut for use as a trouble or pleasure light.

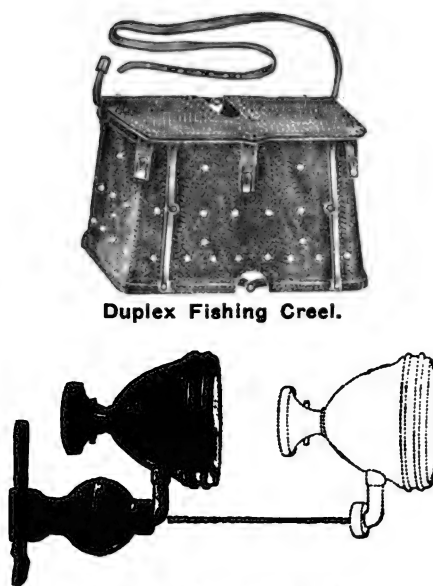
Manufactured by Anderson Electric Specialty Co., 562 W. Van Buren St., Chicago, Ill. Price \$7.50 without rear view mirror; \$8 with mirror.

FOOT AIR ACCELERATOR.

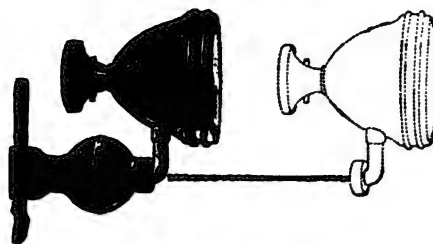
With the increase in engine speed there is an increase in the amount of air necessary for good combustion. To a certain extent the present day carburetor takes care of this excess air automatically. In many engines, however, particularly the Ford, there may be admit-



Foot Air Accelerator.



Duplex Fishing Creel.



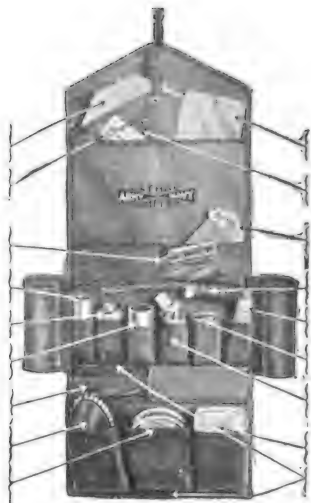
Anderson Auto Reel Light.



New York Foot Supporter.

ted air through the manifold when the engine speed is increased. The Foot Air Accelerator is made to be attached to the Ford car manifold, taking the excess air from around the heated exhaust manifold and connected with a foot pedal. The manufacturers claim six points in favor of the installation—more speed and power, less carbon, a cooler engine, flexibility and increase of 75 per cent. in gasoline mileage.

Manufactured by Foot Air Accelerator Co., Cincinnati, O. Price, \$6. Thirty-day trial.



Nathan Comfykit.

NEW YORK FOOT SUPPORTER.

Every driver realizes that there is a great amount of strain of leg muscle in operating a foot accelerator over rough roads. Every jolt or jar is transmitted through the foot and has its effect upon the action of the engine. To prevent this strain and minimize the jar the New York foot supporter has been designed. As the illustration shows, it is attached to the footboard in such a manner as to support the weight of the foot upon an adjustable hinge. Two wood screws secure the device and once installed the position is always correct.

Manufactured by New York Coll Co., 338 Pearl St., New York, N. Y.

SEMAPHORE AUTO SIGNAL.

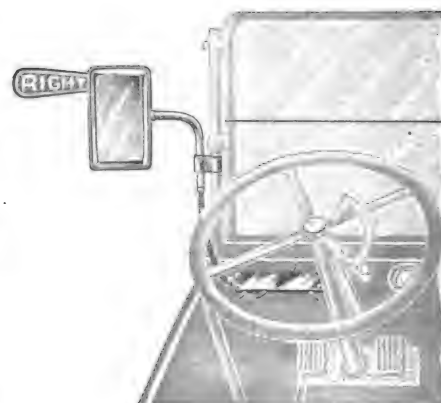
With the ever increasing number of automobiles on the streets and the consequent multiplication of the traffic problems the semaphore auto signal has been designed. This device consists of two units; the first a combination mirror and semaphore arm; the second a dash control. By the control the semaphore may be set in either of three positions, right, left or stop. The color scheme of the semaphore arm is striking, the letters on all positions are black, but for the three positions are on different colored fields. For right the field is green; for left, white, and for stop, red.

Manufactured by Semaphore Auto Signal Co., Inc., 1790 Broadway, New York. Price, \$12.50 complete.

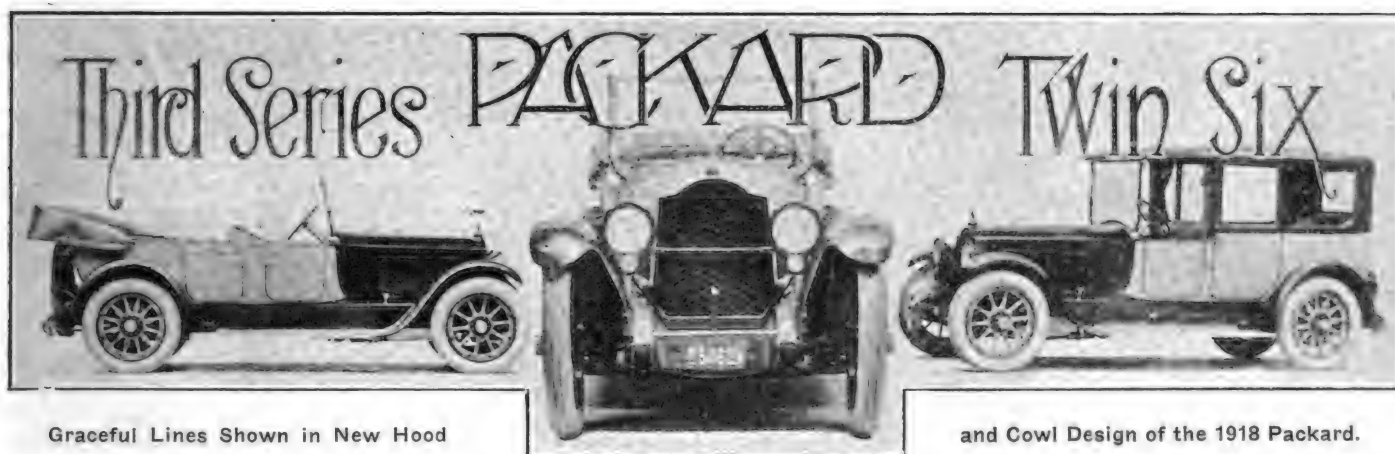
DUPLEX FISHING CREELS.

Duplex Fishing Creels are made of heavy waterproof canvas, reinforced with spring steel, rust proofed metal ribs and fitted with covers that fasten with pull down snap hooks. Air circulation is secured by metal eyelets inserted in front, sides and bottom and through the hole in the top. These creels may be kept sweet and clean by scalding in water, as by this process the fabric is not damaged. They are so designed as to permit folding and may be carried in the pocket or tackle case when not in use.

Manufactured by the Planet Co., Westfield, Mass. Prices ranging from \$2 to \$3 according to size.



Semaphore Auto Signal.



Graceful Lines Shown in New Hood

and Cowl Design of the 1918 Packard.

IN THE third series Packard "Twin Six" the contour of the body design and general lines are recognized as those that have characterized this famous model since it made its initial appearance in 1915, but upon closer examination a number of changes are found which alter radically the appearance of the car forward from the cowl.

Since the perfection of the twin six engine the company has largely concentrated its efforts in improving the body design as it affects the appearance of the car, and a casual glance convinces that these labors have been successful. A number of features which for many years have characterized the Packard design have been substituted by changes in the hood along lines resembling well known foreign contours with a result that is striking.

From a higher, narrower radiator than was formerly used, free flowing lines carry back along the body in an unbroken sweep to the curve at the rear. The bonnet lines slope gracefully as a continuation of the cowl, and the beveled shoulders, a marked characteristic in the Packard radiator for years, are gradually narrowed from the front to the cap molding of the car.

The impression gained from its appearance is of a longer and lower hung car, with cleaner and more prominent lines. The battery has been removed from the running board on the left side of the frame and placed beneath the front floor boards on the right side. This change alone has effected a noticeable improvement in the appearance of the car, which has also been enhanced by the removal from the steering wheel of the control board, the ignition, lighting and fuel mixture controls being set in a convenient position on a cowl board.

A new type of windshield, form fitting and set at a smart angle also plays a beautifying part in the new design. On open cars both halves of the shield are fully adjustable. The front doors are set well back in the body.

The new fenders are of the semi-crown type and made of one-piece steel stamping, which greatly increase their rigidity. A new and distinctive type of Packard design side lamps and tonneau lights are used and in all single compartment enclosed bodies and in the imperial limou-

sine the side lamps are embedded in the front pillars. Quarter lights in the Packard pattern are used on enclosed carriages, excepting the landaulet, in place of the dome lights that were formerly used.

A few minor changes are found in the power plant, but they are refinements of a significant character. The gear shift lever is in the central position and so located that the operator can reach it with the greatest convenience. Improved

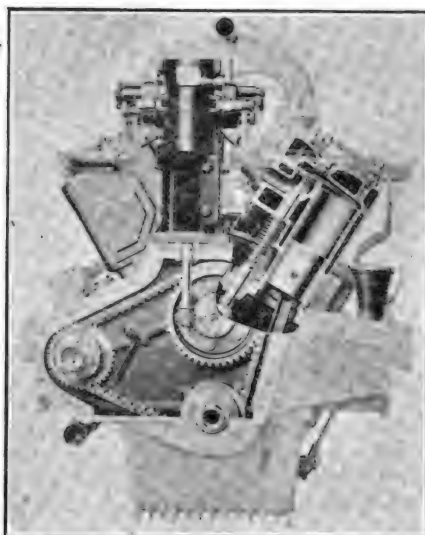
channeling in the manifolds secures an even better distribution of the fuel to the cylinders and results in a more economical operation. A smaller fan drive pulley is being used with the vibration damper.

A slight rearrangement of the terminals is practically the only change in the ignition system, and was made owing to the adoption of the single wire electrical system. Carrying out the rigid standard set by the company for cleaner design throughout, the high tension wires and tubes have been arranged on the cylinder heads and the speedometer gear has been placed at the rear of the transmission and is driven by a special gear on the transmission shaft.

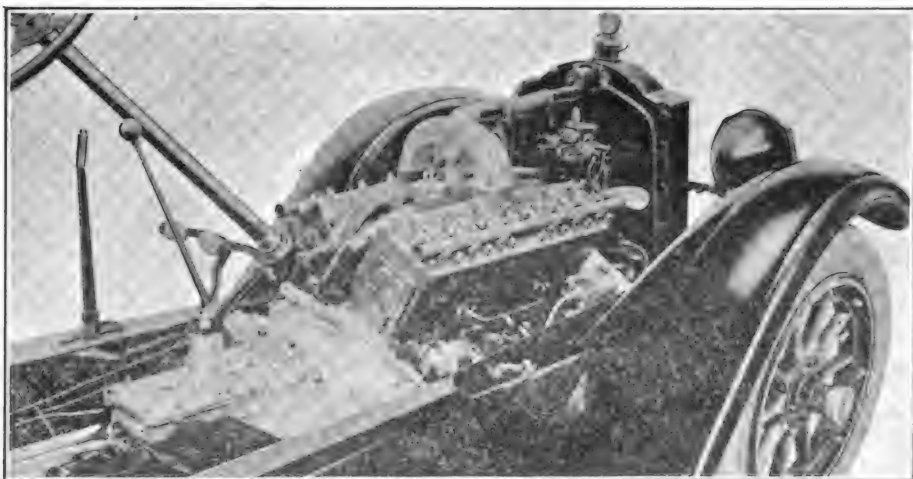
A clutch throw out bearing of an improved type has been installed which has no load on it except when the clutch is disengaged. The clutch pedal is adjustable the adjustment being made by a thumb screw which is readily accessible.

Extra long and extra wide semi-elliptic springs are used in place of the platform springs as initially used on the twin six models. The springs are mounted to avoid any tendency to sidesway in rough going and are parallel to the tapered frame.

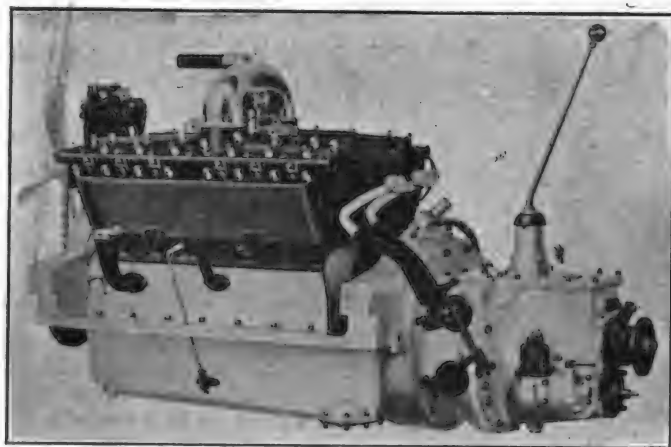
There are two models in the new series, the "3-35," which has a 136-inch wheelbase, and the "3-25," which has a wheelbase of 128 inches. Practically the only variation in the two chassis is in



Valve Gear Assembly of the Packard "Twin Six" Motor.



View from Right Hand Side of Entire Power Plant Assembly on Chassis of the Packard Twin Six.



View of Unit Power Plant, Showing Neat and Compact Arrangement of Pedal and Lever Controls.

the difference in length.

On the shorter wheelbase there are 11 different body styles and six on the longer one. New body styles are being introduced this year in a four-passenger coupe, a six-passenger brougham and an imperial limousine on the shorter wheelbase. All the enclosed bodies are lower with the new straight line roof, with the exception of the six-passenger brougham, which has a roof of the square cornered type.

Simplicity in keeping with elegance is the keynote of upholstery design throughout the Packard interiors, which are modishly finished.

The open cars are priced at \$3450 and \$3850 and the enclosed cars range in price from \$4800 to \$5600.

GASOLINE PRICES SHOW UNUSUAL STABILITY.

Contrary to general predictions and the expectations of the motorists, the price of gasoline has shown unusual stability during the past six months. At present it is ruling from 19 to 26 cents a gallon in different parts of the country and there are no immediate indications of a rise despite the fact that recently warnings have come from many sources regarding a possible shortage in the supply. Nearly 1,000,000 additional automobiles have been put in service since the first of the year and a larger percentage of those already in use are being operated than there were at that time, but the increased demand thusly created seems to have had no effect on the price of fuel, which is holding at about the same level throughout the country.

DAILY AUTOMOBILES TO CRATER LAKE RIM.

Crater Lake, deepest, bluest and most marvelously rimmed and colored lake in the wide world will be made more accessible to visitors this season than ever before. The new national park service has taken hold of its development in earnest and the first result is a fast daily automobile service from the railroad station at Medford, Ore., up the picturesque

Rogue River Valley, to the inn on the edge of the rim.

Another practical improvement is the building of a fine trail on an easy grade from the top of the volcanic rim down to the edge of the water. The former trail made the descent of a thousand feet exceedingly brief in duration, but the coming back was a feat that taxed the sturdiest lungs.

Many visitors do not see the wonders of the lake from the launches on its surface because of the exhausting climb back to the inn. The new trail makes a detour among several highly scenic spots and reaches the waterside through a gentler and more beautiful canyon than the old.

ATLANTA AUTOMOBILE ASSOCIATION ORGANIZED.

The Atlanta Automobile Association has been organized in Atlanta, Ga., for the purpose of promoting automobile shows, good road building and otherwise looking after the interests of motorists.

The incorporators are: George D. McCutcheon, Charles W. Tway, R. H. Martin, George Hanson, K. T. McKinstry, John E. Smith, J. W. Goldsmith, W. A. McCullough, J. H. Simms, B. W. Holt and W. C. Oakes.

TRUSTEE APPOINTED FOR KENT MOTORS CORPORATION.

Referee Charles M. Mason of the bankruptcy court at Newark, N. J., has appointed Louis G. Beekman receiver for the Kent Motors Corp. of New Jersey, as trustee of the Delaware concern of the same name. The sale of the company's plant at Belleville has been postponed for three weeks.

NEW YORK CITY DRIVING LICENSE

Metropolis Now Requires Automobilists to Be Certified and Exacts \$1 Fee Therefor

On Aug. 1 three new automobile laws went into effect in New York state. The most important one considered from the motorist's viewpoint is the Cromwell-Kelly act, which requires all persons driving automobiles in New York City to be licensed. The fee for such a license is \$1 and anyone found driving without a certificate showing that he has complied with the law will be liable to a fine of \$50.

The Hewitt anti-glare law, also in force on that date, provides that a beam of reflected light shall not rise more than 42 inches from the roadbed at a point 75 feet in front of a car. It also requires that the light be of sufficient

power to reveal the road at least 250 feet away.

The third measure is the trailer law, which provides for a fee of from \$5 to \$30 for trailers used with motor trucks.

INDICTMENTS HANDED DOWN IN EMERSON MOTORS.

The federal grand jury handed down additional indictments to Judge Harland B. Howe in the Emerson motors case. The new defendants named are: The Ford Tractor Co. of South Dakota, Ford Tractor Co., Inc., of Delaware and William B. Ewing.

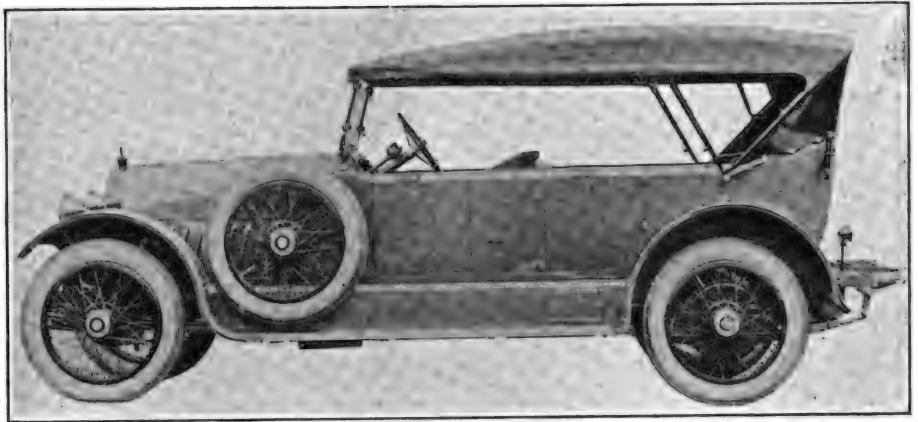


Students of the School for Salesmen Conducted at the Factory of the Packard Motor Car Co., Detroit, Mich.

McFarlan Six Discloses Added Features

THE result of another year's tireless effort to produce a high powered six-cylinder motor car of the highest efficiency, greatest dependability and the most correct design is the McFarlan 90; a distinctive and aristocratic car. This car is made by the McFarlan Motor Co. of Connersville, Ind., which concern makes a specialty of special body designs and though they make a number of stock types, practically any type of body can be had, mounted on the McFarlan chassis.

The McFarlan organization is the re-



Regular Type 127 McFarlan Six Touring Car, a Car of Distinctive Refinements, with Deep, Pleasing Tonneau.

The chassis as shown in the illustration is clean and free from useless braces and control rods. The engine is a Teetor and is compact in design, being carried with the clutch upon a pressed steel, heat treated, extra heavy sub-frame.

The engine is of the T head type, six cylinders, cast in block, with a bore of 4½ inches and a stroke of six inches, giving a horsepower of 48.6 S. A. E. rating and according to the manufacturers 90 horsepower under actual tests.

The lower part of the crank case is of aluminum, thus cutting down to a great extent on the total weight of the engine. Both the intake and the exhaust valves, which are completely enclosed, are inclined toward the centre, greatly reducing the width of

bends are eliminated and a free passage for gas obtained. The main bearings are lubricated under a pressure varying from five to 30 pounds at different motor speeds. The connecting rods, cylinders, pistons and other parts being lubricated by the splash system.

An extra large centrifugal shaft driven pump with bronze impeller serves to circulate the water through a Mayo honeycomb radiator for cooling. The pump is located on the left side of the engine and driven by the timing gear.

Fuel is furnished to the engine from a 28-gallon tank located in the rear and fitted with a quantity gauge, through a vacuum feed to a Stromberg, two-nozzle type carburetor, which is located on the left side of the engine.

The clutch, which is of the multiple disc type, is mounted in the flywheel of the engine and is adjustable for wear. The transmission gearset is connected with the clutch through a universal joint and is mounted on the same sub frame as the engine. It is of the selective type, three speed and reverse, and is housed in an aluminum case. The shafts are mounted on Timken bearings and are adjustable.

The propeller shaft is of tubular chrome nickel steel and fitted with two Spicer universal joints, one at each end of the shaft. The rear axle is of the full floating type, Timken made, and fitted



Seating Arrangement and Instrument Board of Piano Finish Mahogany on Mr. Hellman's Car.

sult of 75 years earnest endeavor and the ambition of every unit of this organization is to produce the best known to the motoring world. Their ambition always has been to produce a limited number of automobiles incorporating elegancies and refinements for representative citizens of the world. For this reason the fluctuations in the price of the machine are simply indications of changes in the price of the high grade steels, bronzes, leathers and other materials entering into the construction of the automobile.

Double Ignition Is New.

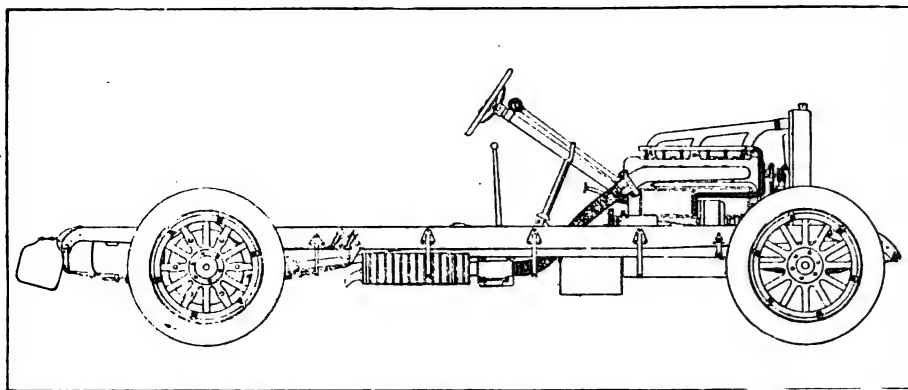
The McFarlan chassis is perfectly balanced for holding the road; will turn in the average street and is built to receive and distribute the stream of power developed by the engine. The most notable change in the McFarlan chassis over last year is the double ignition system, operated by separate switches and connected to separate sets of spark plugs. One ignition system is a Westinghouse battery of six volt, 125 ampere-hour capacity, and the other is a high tension magneto.

the explosion chamber.

The exhaust manifold is of special design and is made so that all possible



Type 127 Seven-Passenger Touring Car with Extended Victoria Top, Built Especially for Mr. Marco Hellman of Los Angeles.



Side View of McFarlan Six Chassis Shows Ample Spring Suspension, Low Centre of Gravity and Centralized Control Mounted on the Steering Column.

with Timken bearings throughout. The driving gear is spiral cut to eliminate noise and the differential, as it is mounted on the bearings, is adjustable.

The front axle is also Timken made, the knuckles and wheels being supported on Timken bearings. The front springs are semi-elliptic and measure $2\frac{1}{4}$ by 40 inches. The rear measuring $2\frac{1}{2}$ by 64 inches are of special McFarlan cradle suspension.

The standard equipment includes wood wheels of the artillery type, fitted with 12 extra heavy spokes. For special equipment Houk No. 6 wire wheels are furnished.

The steering gear is mounted on the left with gear shift control at the centre. The foot brake is external contracting and the hand brake internal expanding, both acting upon large drums on the rear wheels.

The starting and lighting system is Westinghouse.

The equipment of the cars is particularly complete and consists of the following: One man folding top, top slip cover, top curtains, clear vision windshield, flexible robe rails, foot rest, disappearing auxiliary seats, combination headlights, with Warner lenses, tonneau lamp with separate switch, two dash lamps, gasoline spray primer for cold weather starting, engine driven tire pump, tool compartment in each front door, complete set of tools, jack, tire repair kit, pockets in rear doors, Klaxon electric horn, demountable rims on all wood wheels, one spare rim, tire carriers for two spare tires, shock absorbers, speedometer, eight-day clock on dash, ammeter, oil pressure gauge, carburetor adjustment on steering post, fuel tank gauge, portable trouble lamp and full set of instruction books.

In addition to the above the following equipment is furnished for closed cars. Frameless windows with adjusting handles, silk window drapes, silk roller window shades, dome light, shoulder reading lights, lounging pillows, foot hassocks, arm rests, portable dictograph in inside compartment, vanity cases, smoking requisites and extra tonneau foot rug.

HOW TO USE A SPOTLIGHT.

Improper use of the spotlight carried on the windshield has led to restrictions by law in some of the states. Unless

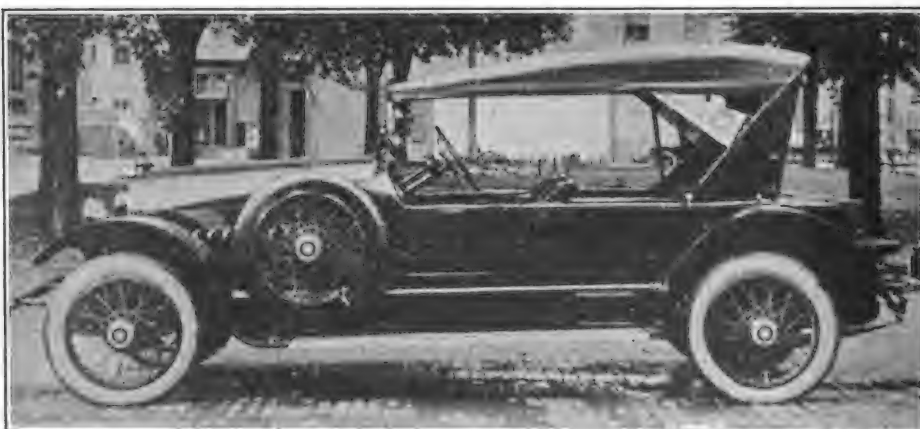
more care is exercised in the manipulation of this most excellent attachment more hostile legislation may be expected. So many laws already hedge the motorist about that it would be a pity to allow the abuse of one of the most effective conveniences known to night driving to be denied to the use of those who properly appreciate it.

When carried higher than the other lights and used to light the road surface, as, unhappily, is too often done by selfish or thoughtless motorists, the spotlight comes in for unfavorable criticism. When not in use it should be turned off. If not switched off it blinds drivers of approaching vehicles as well as others coming from the opposite direction. Some drivers, even, have the objectionable practise of turning light on an approaching car.

Among proper functions of the spotlight is to illumine the right side of the road, thereby clearly defining the ditch. It is valuable to examine signboards.

DAWSON BREAKS 24-HOUR RECORD IN CHALMERS CAR.

Joe Dawson, driving a Chalmers stock chassis, established a new world's 24-hour record at Sheepshead Bay on Aug. 1 and 2, covering 1900 miles, which figure is 81 miles better than the previous record of 1819 miles, made by Ralph Mulford in a Hudson car. In the first hour Dawson covered 83 miles and for the entire distance averaged 79 $\frac{1}{16}$ miles per hour, including stops.



Model 124, Destroyer Design, Four-Passenger Touring, Made for Mr. George W. Clay of the Sudduth Stock Farm of Paris, Ky.

BARNES FOUNDRY AND MFG. CO. TO MAKE CASTINGS.

The Barnes Foundry & Mfg. Co. has been incorporated in Michigan with \$2,000,000 capital, consisting of \$1,000,000 seven per cent. cumulative preferred and \$1,000,000 common stock.

A modern plant of fireproof construction is to be erected in the River Rouge district, which will be ready for occupancy by the first of next year. Many of the men identified with the enterprise are well known in the automobile industry.

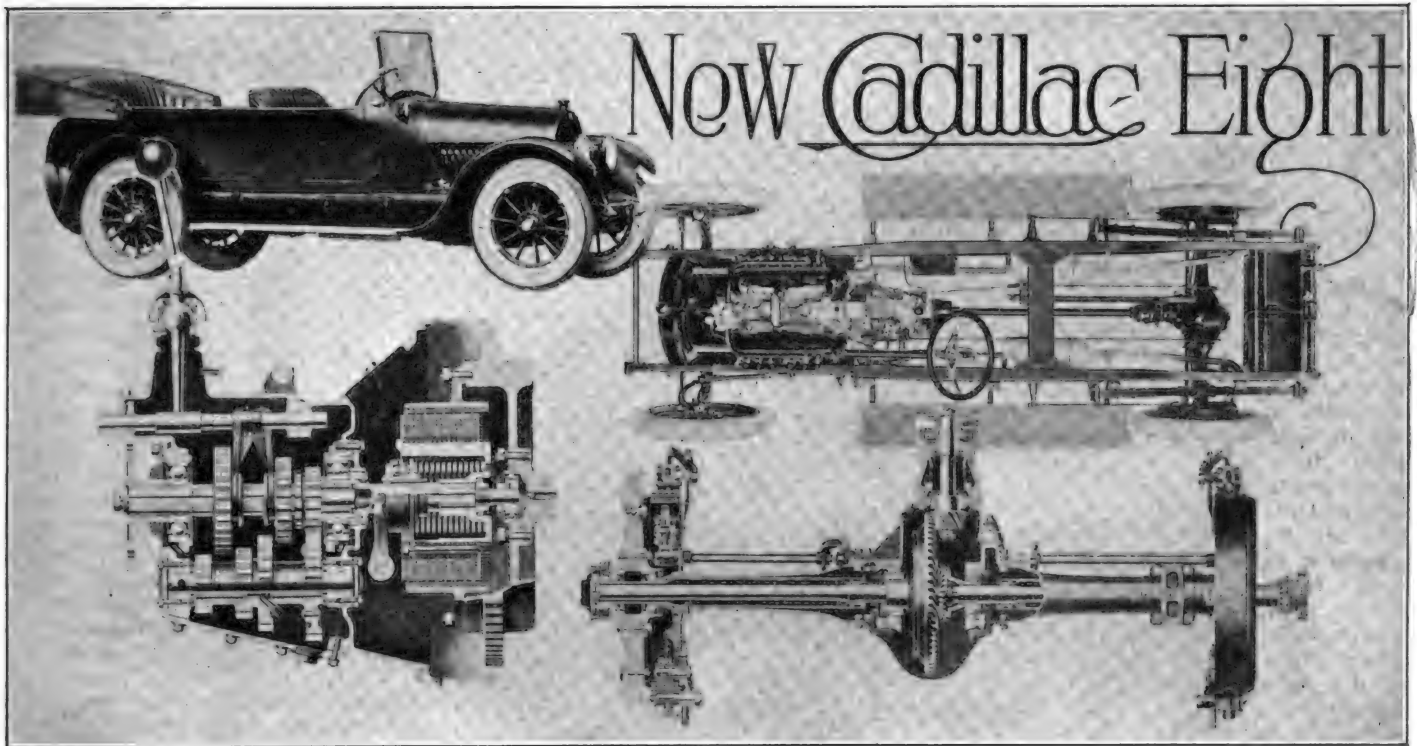
The president and general manager of the company is Claire L. Barnes, formerly a high official in the Willys-Overland organization, and the vice president is George W. Smith, formerly production manager of the Maxwell Motor Company and recently manager of the J. I. Case plant at Racine, Wis. Charles E. Pelton, secretary-treasurer of the company, is assistant manager of the Motor Products Corporation and C. E. McArthur, who is to be general foundry superintendent, now holds a similar position with the J. I. Case Company at Racine.

The directors are: Claire L. Barnes, George W. Smith, Charles E. Pelton, D. B. Lee, George E. Edmunds, William E. Metzger, Frank G. Smith, Jr., Archer A. Landon and Edward A. Loveley.

BIG FORD DISTRIBUTING AGENCY OPENED IN NEW YORK.

E. R. Hollander, for many years one of the largest importers of high priced automobiles in New York City, recently formed the Hollander Sales and Service, Inc., of which he is the head and will deal exclusively in Ford cars in the New York territory.

He has acquired the old home of the Ford company at 1723 Broadway and is erecting one of the finest service stations in the city on 55th street, west of 10th avenue, which it is expected will be ready for occupancy by Oct. 1. The building is 100 feet square and six stories high. It will have two car elevators and a passenger elevator. A large stock of genuine Ford parts will be kept on hand and the entire organization is to be composed of experienced men.



ENTERING upon its fourth year's production of eight-cylinder cars, the Cadillac Motor Car Company of Detroit, Mich., has retained in its new models the original characteristics of the V type, high speed, high efficiency motor, but has incorporated further refinements of the principle.

In the assembled illustrations forming the headpiece is a picture of the type 57, standard seven-passenger car, an overhead view of chassis and sectional drawings of the new transmission assembly and rear axle.

In the new model, which will be known as type 57, there will be 10 body styles, which cover practically all of the standard types, including seven-passenger touring, four-passenger phaeton, roadster, town limousine, town landaulet, brougham, completely enclosed and practically convertible car, convertible victoria, limousine, imperial limousine and landaulet.

The most important change in construction from a mechanical viewpoint is the use of detachable cylinder heads, which are attached to the cylinder blocks by 20 nuts each and are made gas and water tight by special copper-asbestos gaskets. While none of the compactness, lightness and rigidity of construction of the former type is sacrificed, with detachable heads much is gained through the greater accuracy in manufacture which is obtained. It is also a decided advantage for the owner to have detachable cylinder heads on the motor, as it makes the valve assemblies, cylinders and other parts more accessible for cleaning and adjustment.

The transmission in the new model is of the selective sliding gear type, smaller than that formerly used and of refined design. It is more compact and lighter and the gears are shifted with even

greater ease than they were formerly.

A means of regulating the flow of air under the hood has been provided to obtain greater cold weather efficiency from the motor. Shutters are located inside the louvres, which are slanted at an angle of six degrees to conform with a similar tilt of the windshield. Closing the shutters decreases the flow of air through the hood and an angle piece is provided whereby the space between the

hood and the hood shelf can be closed, further restricting the inflow of cold air over the motor in winter time.

The hood has been made two inches longer without encroaching on the body space and is higher, as is also the radiator. A new cowl design was adopted to harmonize with the higher radiator. On all open bodies belt line moulding is used, with narrower mouldings on doors, hood and fenders. The doors are of the advanced square design type. The open cars are finished with Cadillac blue, which was used on type 55 open cars, and Calumet green with black trimmings is standard finish on the enclosed bodies.

The driving compartment has more leg room and a more comfortable position for the driver is obtained through a different arrangement of the toe board, which is set at a different angle.

A prominent feature of the new models is a device for tilting the headlight reflectors, which lowers the direction of the light when necessary to keep it from glaring in the eyes of oncoming drivers. It is operated by a small lever attached to the steering post.

The automatic raising device for the top, which was an exclusive feature on the type 55, is being used on all the type 57 open models. When the top is raised the load is taken by powerful springs, located in the main bow sockets, which after top has been lifted a few inches, automatically open it to its full extent.

Black pantasote is the top material used in all open models. The side quarters are lined, covering the extension bow sockets and joints. Upholstery is hand buffed, long grain, black leather, technically known as a "dull, semi-water" finish. Seat cushions in the touring car are slightly lower, giving the effect of higher seat backs and greater comfort to all occupants of the car.

Automobiles Packed In Farming States

In 1916 there were 3,513,000 automobiles and 251,000 motorcycles registered in this country, according to the U. S. Office of Public Roads.

The use of the cars is shown by the population per car in the different states. The great agricultural state of Iowa stands first, with a car for every 11 persons, and then follow California with 12 persons to each car, Nebraska and South Dakota with 13, Kansas with 16, Montana and North Dakota with 18, Michigan with 19 and Indiana and Ohio with 20. These are all agricultural states.

It is not the great manufacturing states, like New York, with a car to every 50 inhabitants, or Pennsylvania, with a car to every 37, that show the highest popular use of the motor vehicle. The fact is, the farmer, like the rancher in Arizona, where there is a car for every 21 persons, finds the automobile invaluable in removing the isolation of country life.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

Shadburne Bros. Co., Chicago, Ill., which entered the automobile manufacturing field with the Shad-Wyck Six, on which production will commence this month, and later extended its activities through the purchase of Bour-Davis Co. of Detroit, have also acquired the Dixie Motor Car Co. of Louisville, Ky., manufacturers of the Dixie Flyer. The entire plant equipment of the Bour-Davis Co. has been moved from Detroit to Frankfort and production resumed.

The **Marlin-Rockwell Corp.**, which recently acquired all the assets of the Standard Roller Bearing Co., Rockwell-Drake Corp., Mayo Radiator Co. and the Marlin Arms Corp., has announced that the sales of all the subsidiary companies, except the Marlin Corp., will be directed by the sales organization of the Standard Roller Bearing Co. of Philadelphia.

The **Jenkins Vulcan Spring Co.**, St. Louis, Mo., will erect a plant at Richmond, Ind., and will employ about 75 men to start in the new factory. The capital of the company is \$300,000, which is about two-thirds subscribed. T. B. Jenkins is the president.

K. W. Hooth of the engineering department of Fuller & Sons Mfg. Co., is in Washington working in conjunction with federal engineers on a transmission design for the war department.

The **Reo Motor Car Co.**, Lansing, Mich., has announced a new price schedule, which became effective Aug. 1. The new list is as follows: Model "R" touring and model "S" roadster, 4-cylinder, \$985; model "M" touring and model "N" roadster, 6-cylinder, \$1385; model "F" $\frac{3}{4}$ -ton roadster, \$1125; model "J," two-ton chassis with driver's cab, \$1800; sedan, \$1950.

The **Ford Motor Co.** has laid off 11,000 men for the annual inventory and while repairs are being made to the machinery at the plant. A force of 25,000 men are still working, as the company is over 125,000 cars behind in its orders. The company's fiscal year ended July 31 and the annual statement is expected soon. It will show a total production of close to 735,000 cars for the year.

Henry Ford & Son, Dearborn, Mich., has been incorporated at Lansing with \$1,000,000 capital to make tractors. The capital is divided into 10,000 shares, Henry Ford and his son each holding 3333 shares and Clara J. Ford 3334.

The **B. F. Goodrich Co.**, Akron, O., for the first six months of this year reports net earnings of \$5,200,000 as compared with \$4,800,000 in the corresponding period last year. The gross sales for the period are estimated at \$85,000,000 as compared with a total of \$70,990,782 during the first six months of 1916.



W. C. Rowley, New Traffic Head for Federal Motor Truck Co., Has 32 Years of Railroad Experience Back of Him.

W. C. Rowley has been elected vice president in charge of sales of the Federal Motor Truck Co. to succeed J. W. Bowman, who recently resigned. Rowley has been a member of the Federal directorate for some time and before joining the Federal organization had been with the Michigan Central railroad for 32 years.

The **Hood Rubber Co.**, Watertown, Mass., will issue \$1,250,000 additional preferred stock and \$500,000 common stock. At a recent meeting of the stockholders the authorized preferred stock was increased to \$5,000,000 and the authorized common to \$1,000,000.

The **General Motors Co.** for the 11 months ending June 30 report earnings of \$28,750,000 as compared with \$24,862,198 in the same period ending June 30 last year. The gross sales were approximately \$185,750,000, as compared with \$145,159,746 last year. The profits for the 12 months are estimated at \$30,000,000. The sales of cars and trucks for the period totaled 169,415, as against 121,113 in 1916.

The **J. W. Murray Mfg. Co.**, Detroit, Mich., in its balance sheet as of June 1 this year, shows current assets of \$623,499; current liabilities of \$247,849, and net working capital of \$375,650. Sales for the first six months of this year were \$954,000, on which there is shown a net profit of \$108,000.

The **Pathfinder Motor Co. of America**, a Delaware corporation, capitalized at \$2,000,000, divided into 500,000 shares of preferred and equal amount of common stock of no par value, has acquired out-

right the Pathfinder Co. of Indianapolis and has made arrangements for refinancing the concern. With the increased capital it is planned to expand the plant and to also engage in the manufacture of commercial vehicles. Officers of the new company are: President, Charles McCutcheon of Indianapolis; vice president, Fred C. Dorn, Cleveland; secretary and treasurer, Paul N. White, Indianapolis. The directors of the company are: C. J. Root, Terre Haute; Crawford Fairbanks, Terre Haute; A. C. Brown, St. Louis; William A. Umphries, Indianapolis; Paul N. White, Indianapolis; Charles McCutcheon, Indianapolis; George H. Mosher, Los Angeles, Cal.

The **United States Rubber Co.** for the quarter ending March 31 had a surplus of \$905,395 after payment of \$2,131,497 in preferred dividends.

The **Chevrolet Motor Co.** for the six months of the current year reports total sales of 65,235 cars, valued at \$29,704,773, as compared with 32,514, valued at \$16,338,585, for the same period in 1916. The production for the first six months was almost equal to the entire production in 1916, when 69,690 cars, valued at \$31,877,375, were produced and sold.

The **Paige-Detroit Motor Car Co.** has announced a new price schedule in which the different models are listed as follows: Stratford 6-51, \$1595; Fairfield, 6-46, \$1450; Linwood 6-39, \$1260; Brookland 6-51, \$1795; Dartmoore 6-39, \$1260; limousine 6-51, \$2850; town 6-51, \$2850; sedan 6-51, \$2400; sedan 6-39, \$1875.

Henry M. Leland and **W. C. Leland**, formerly president and vice president respectively of the Cadillac Motor Car Co., who recently resigned to engage in the manufacture of airplane engines, have acquired the old plant of the Warren-Detroit company in Detroit.

A. E. Drake has been appointed manager of the insurance department of the Commonwealth Finance Corp., 100 Broadway, New York City. Thomas A. Dobson has been appointed manager of the credit department of the corporation and H. S. Kerr has been promoted to the position of assistant treasurer.

The **Electrocraft Storage Battery and Supply Co.**, 5845 Delmar boulevard, St. Louis, Mo., distributors of Electrocraft and Philadelphia storage batteries, has purchased the Auto Battery and Supply Co., 3912 Washington boulevard, in that city, and will conduct it as a retail station.

B. F. Everitt, well known throughout the automobile industry through his connection with several of the large manufacturing companies, has been elected president of the Springfield Body Corp., Detroit, Mich. George W. Woods has been elected secretary and treasurer.



Brighton Road (Section of Lincoln Highway showing a 10 per cent. grade), Ben Avon, Pa. Constructed with "Tarvia-X" in 1914

Tarvia-Slag on Lincoln Highway—

IN 1914 the Borough of Ben Avon, Pa., a suburb of Pittsburgh, found it necessary to pave an unimproved section of one of the main roads passing through that Borough (now a part of the Lincoln Highway). Their problems were steep grades, heavy traffic and limited funds.

Guided by their past successes, they turned to Tarvia for a solution. They used crushed blast-furnace slag, bonding and sealing with "Tarvia-X" by the Penetration Method. The result has been a most economical and satisfactory road.

After two and a half years of continuous traffic up and down hills, dipping into a cañon-like ravine, this Tarvia-Slag road is in excellent condition.

It has a tough, plastic, cementitious surface, good alike for horses and automobiles. Such a surface can be

maintained indefinitely at low cost.

Of all bitumens Tarvia, by its superior adhesive and cementing properties, is the one best adapted for use with slag. Tarvia and slag, when combined, furnish a road-surface remarkable for its durability and economy.

Further information concerning this and many other Tarvia-Slag roads built throughout the Middle States may be had on request. Address Special Service Department at our nearest office.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems.

The advice of these men may be had for the asking by any one interested.

If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

The **Barnett** Company

New York	Chicago	Philadelphia	Boston	St. Louis	Cleveland	Cincinnati	Pittsburgh
Detroit	Birmingham	Kansas City	Minneapolis	Nashville	Salt Lake City	Seattle	Peoria
The Paterson Mfg. Co. Limited	Montreal	Toronto	Winnipeg	Vancouver	St. John, N. B.	Halifax, N. S.	Sydney, N. S.



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Wise to Avoid Waste of Gasoline

N. A. C. C. Plea to Motorists and Manufacturers

The National Automobile Chamber of Commerce, in a bulletin to members, entitled, "Suggestions for Constructive Publicity," and signed by General Manager Alfred Reeves, states that gasoline should be economized and waste avoided.

"However, processes for extraction of increased percentages of gasoline from crude oil are being put into extensive operation," continues the bulletin. Kerosene can be used successfully if necessary and there are a number of kerosene carburetors on the market. Government reports show almost unlimited deposits of oil bearing shale in western states from which large quantities of gasoline can be extracted. Many oil wells in Mexico are still capped. Alcohol can be used as a gasoline substitute or in combination with it. Any farmer can distill alcohol from waste products at small expense if certain legal restrictions are removed. Distilleries that suspend manufacture of whiskey can make alcohol in large quantities from sawdust and other wastes."

In reference to a suggestion that the motor car should be called a passenger car or automobile and not a pleasure car, the bulletin in support of this argument cites the following facts:

"The automobile fills a real transportation need. It is estimated that 40 per cent. of the motor cars in America are owned and used by farmers. There are three times as many automobiles in Iowa, Nebraska and California in proportion to population as in New York state, Massachusetts, Pennsylvania or Illinois.

"The increase in car sales has been several times larger in agricultural states during recent years than in manufacturing states. Doctors, traveling salesmen, highway officials, municipal department heads, contractors and builders, and men engaged in many other lines find the automobile indispensable in their work and by its use save many hours daily.

"Wholesome recreation in the open air is a great revivifier and invigorator. It enables the hard working business man to continue intense effort without breaking down. President Wilson takes his recreation in an automobile every afternoon."

In speaking of the great service that the motor car is rendering people in this country, the bulletin states that greater passenger mile service is given by the passenger automobiles in the United States than by the entire railroad or street railway systems of the country. The 3,700,000 passenger cars, averaging 5000 miles a year and three persons each, give a total of 55,500,000,000 passenger-miles. At the rate of two cents a mile this service is worth \$1,100,000,000 a year.

The letter includes sound advice to the manufacturers on the co-operation that should be given to the chamber's proposed campaign of constructive pub-

licity to stem the current of harmful newspaper comment. The items which it designates as likely to do serious harm are specified as "misleading, untrue and purely speculative ones, injudicious criticism, such as the purchase and use of automobiles being an unwarranted extravagance, the likelihood of shortage in gasoline causing suspension of use of cars, possible commandeering of cars and trucks by the government, etc." The chamber has assurances that there will be no commandeering. It insists so strongly that reports of "stunts," speed runs, tremendous profits, etc., constitute a form of publicity that may not be of real interest to editors and readers that a chorus of editors and readers may almost be heard shouting "Amen!"

FORD LIGHTING SYSTEM.

A three-unit lighting system for the Ford car, called Genolite, marketed by the Detroit Starter Co. of Detroit, manufacturers of the Vestal Products, is designed entirely independent of the regular Ford magneto system and consists of a generator, a storage battery and a special controlling and dimming switch mounted on the steering column. All units are designed according to accepted automobile practise and contain the latest features of car lighting systems.

The generator is of the square type and is mounted on a stamped steel bracket, which can be attached very easily without any machine work or altering of the engine. The output is six volts and the generator begins charging at a car speed of about nine miles per hour; at 13 miles per hour speed seven amperes are generated. The voltage is kept constant by the Ward-Leonard regulator and the current is used for charging the storage battery, which has a capacity of 40 ampere-hours and is mounted in an attractively enameled box on the running board.

The dimming switch, which is accessibly located on the steering post, has three positions, high, low and off. The headlights being controllable for bright light for touring or dim for city driving.

Included with the outfit is sufficient wiring for the whole system, and two special nitrogen bulbs for the headlights. These bulbs are special and are fitted with two filaments, which make the dimming possible somewhat after the well known Hi-Lo principle.

In addition to the lighting system the outfit makes a practical installation, because it can be used for ignition as well. This, in addition to the regular Ford magneto ignition, makes a positive ignition system at all times and under practically all conditions.

The outfit may be purchased complete as above described for \$38.85, and for those desiring but the generator alone the outfit, less the storage battery, at a price of \$28.85.

MAINE WILL PROTECT MOTORISTS AGAINST EXTORTION.

Fearing that the State of Maine would be placed on the black list by motorists from other states owing to the mulcting of tourists by unscrupulous sheriffs and town constable, the Maine Automobile Association is taking steps to prevent unwarranted persecution of travelers over the roads before these unsavory activities have given the state a bad name throughout motordom.

The present situation arose from the fact of a joker slipping into the highway law providing that, "bail commissioners must appear and bail must be furnished for the appearance in court of the offending automobilists." Many speeders were arrested and usually fined \$20 after the law went into effect and testimony in these cases indicated that the men clothed with the authority to carry out the prosecutions showed exceptional zeal in arresting mainly motorists from other states. It also appears that through some peculiar coincidences in many cases, bail commissioners have happened right on the spot when an arrest was made, prepared to do business. Drivers in other instances have been obliged to give up money, watches or other valuables as a guarantee of their appearance in court.

Maine's new headlight dimmer law for automobiles and electric cars is effective Aug. 15. There is a ruling limiting the candle power of automobile headlights to 24. Spotlight use is restricted to right, left or rear of car, and when stationary.

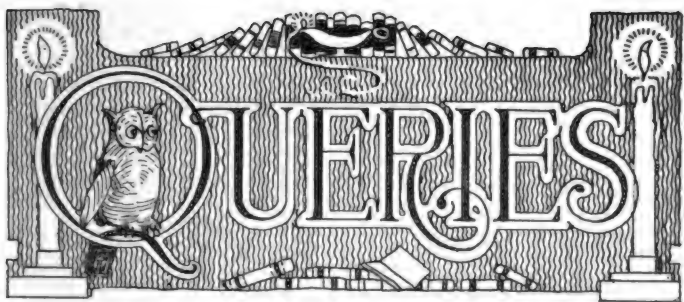
THREE BUYERS FOR PULLMAN COMPANY ASSETS.

The Pullman Motor Car Company's plant at York, Pa., the equipment and finished product and service department, with stocks, has been sold to three separate parties. Theodore Friedeberg, president of the Lozier Motor Company, purchased the plant and site on which it stands. No announcement was made regarding the use to which it will be put, but it is understood that he was acting for New York interests in the purchase. The land and buildings brought \$43,000, and \$197,000 was paid for the remaining assets, not including the service department, which was sold to Louis Goldstein & Sons of Philadelphia for \$115,000, and 97 completed cars, which were bought by Daniel S. Dwyer of New York for \$53,597.

The total sum realized, it is believed, will enable the receiver to pay all creditors and leave a balance sufficient for the payment of a 10 per cent. dividend in liquidation to the common stockholders.

PRICE OF FORD CARS WAS NOT ADVANCED.

The rise in the price of the Ford cars which was generally expected on the first of the month did not materialize, although it is reported on fairly good authority that an increase may be announced at any time.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

DO YOU THINK THAT THE PRACTISE OF RUNNING IN CAR TRACKS IS INJURIOUS TO TIRES AND WHY?

To the writer of the best answer to the above question \$2.50 will be paid. The best answer received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of September. The contest is open to every subscriber.

ADJUSTING THE BRAKES.

(Mr. D. E. Janson, Providence, R. I.)

The brakes are one's best friends in case of emergency, yet few drivers realize what importance the conditions of the brakes bear to the safety of the passengers. It is every driver's duty to other traveling motorists, as well as to himself, to keep his brakes in the best order possible while he is driving on the public roads.

An examination of the brakes should be made at least once every week and adjustment made if necessary. The rear wheels should be jacked up and the emergency or hand brake pulled up until the bands begin to bind on the drums. Then each wheel should be turned by hand and the friction of the bands on the wheels compared and adjusted so that they may exert approximately the same pressure upon each drum.

The service brake should be examined and adjusted in the same way.

If the adjustments are not obtained easily the condition of the bands should be noted. Grease leaking through the felt washers in the axle housing or past the axle bearings often causes serious trouble because the brake cannot be relied upon when it is oil or grease soaked. For this reason, should the grease exudations be copious the cause should be removed and the felt washers replaced.

Another cause of trouble which is more noticeable with the external brake is the gathering of dirt. The external bands should be cleaned frequently.

The brake rods should be inspected often, as they frequently are bent. They should be straightened and readjusted. The brake lining should be watched and as soon as evidences of wear are apparent the fabric should be replaced. Should the lining become glazed or smoothed from the action of heat and grease it may be cleaned with kerosene and a stiff brush. The use of a good fabric is to be recommended

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TRUCK SPECIAL

Satisfactorily meets the scarcity-of-leather situation. Costs less than even the poorest split leather but wears better.

Comes in 60-yard rolls 50 inches wide. Cuts in multiples without waste.

You should use it to save money.

You should use it to save leather.

It is waterproof, washable and its fine leather appearance and "feel" leave nothing to be desired.

Write for Truck Special Booklet,
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DuPont Fabrikoid Co.,

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Works at Newburgh, N. Y. and
Fairfield, Conn.

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World's Largest Makers
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Cozy Camp-Mobile



On the Road, Absolutely Free and Independent.

Car Camp Tours

Give Wife and Kiddies all the pleasure of touring and camping and they have none of the inconveniences of tent life, no matter how long the absence. The equipment, good for years of service, can be bought with the saving of hotel expenses for three or four weeks. The trailer can be used for freighting and for pleasure as desired.

The trailer carries all luggage. The patented construction can be set up by one man. No stakes to drive and no ropes to stretch. The outfit affords every comfort for shelter, sleeping, cooking and dining; the food is carried in a dust-tight, ice-cooled compartment. The camp has luxurious spring beds for four, shelves, screened windows and full head room.

TRAILER EQUIPMENT.

Two 42 in. wire spring beds, with two regular bed mattresses, each designed for two persons; collapsible table; two-burner gasoline stove; two-compartment ice box, 40x15x9 in.; two locker drawers 20x14x9 in.; three shelves.

Weight, about 600 pounds; shipping weight, crated, knocked down, with wheels inside crate, about 875 pounds.

TRAILER PRICES.

Sarven patent wheels, 1 1/4 in. rubber tires, \$165.
Wood artillery wheels, 2 in solid rubber tires, \$177.50.
Wood artillery wheels, 3 in. pneumatic tires, \$183.50.
These include trailer and all equipment, f. o. b. Indianapolis, Indiana.

If your dealer does not display a Camp-Mobile, write us for special introductory offer to users.

LIBERTY BONDS ARE GOOD AS GOLD WITH US

Cozy Trailer and Equipment Co.

42-44 Kentucky Ave., Indianapolis, Ind.



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in any case, as poor fabrics endanger the lives of the passengers.

Proper usage of the brakes is important in their upkeep. A brake should never be applied as hard as possible. It should be applied softly at first, released and applied again until the car is stopped. The locking of the wheels by the brake is not an efficient braking means and harsh application of the brake is only pardonable in case of emergency.

CADILLAC 55 CARBURETOR.

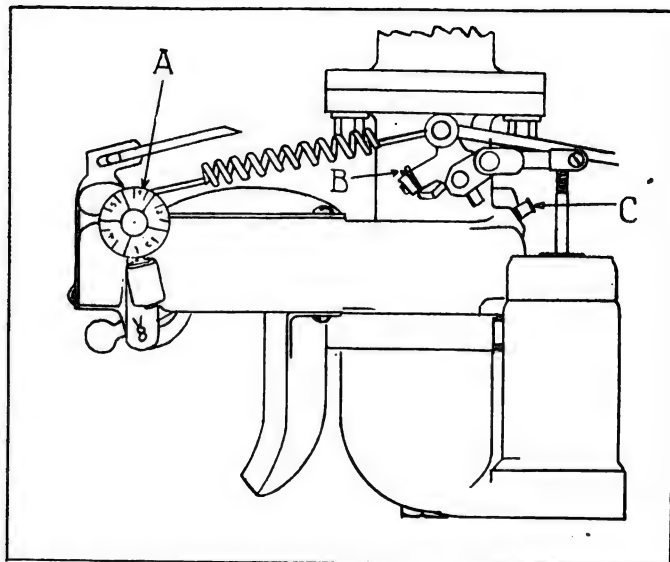
(M. W., Philadelphia, Pa.)

Will you kindly tell me how to adjust the carburetor on a Cadillac model 55 car?

Retard the spark and advance the throttle lever about two inches on the sector at the steering wheel and start the engine, then advance the spark as far as possible without causing the engine to knock.

After the engine has warmed up turn the air valve screw A in an anti-clockwise direction until the engine backfires from too weak a mixture, then turn it to the right or clockwise until the engine fires on all cylinders.

Close the throttle and adjust the screw B so that the engine can be throttled down to about 300 revolutions per minute and with the engine running at this speed again adjust the screw A until the highest engine speed is attained without skipping.



Cadillac Carburetor: A, Air Adjustment; B, Throttle Adjusting Screw; C, Economizer Adjustment.

Now open the throttle until the shutter attached to the right hand end of the throttle shaft just covers the slot in the carburetor body. Then adjust the screw C to a point which produces the highest engine speed, or to a point where the engine begins to slow down slightly from a lean mixture. Turning this adjustment to the right or clockwise increases the proportion of gasoline to air by cutting off the air.

GRABBING CLUTCH ON DORT CAR.

(E. S. A., Bridgeport, Conn.)

The clutch action on my Dort car is very harsh, every time the clutch is engaged the tendency is to "grab" rather than to gradually carry the load as it did at first. The clutch facing seems to be in good condition and is not worn to any extent. How can I prevent this trouble and what, in your opinion, is the cause of it?

The trouble is probably caused by the slight wear on the facing where the plunger compensators rest, allowing a portion of the clutch area to catch in the flywheel the moment it is engaged. To make the action smooth it is essential that the whole area should gradually form a sort of drag upon the flywheel, catching only after the wheels have started to move the car forward.

If you will remove the cover plate on the flywheel housing you will find on the inner rim of the cone, inside the fly-

wheel, six cartridge shaped projections containing springs. Upon these projections are nuts held in place by cotter pins. Remove the cotter pins and turn each nut off about half a turn, then replace the cotter pins. This should cause the clutch to engage more smoothly, since the spring tension is released.

STUDEBAKER STEERING GEAR ADJUSTMENTS.

(F. A., Providence, R. I.)

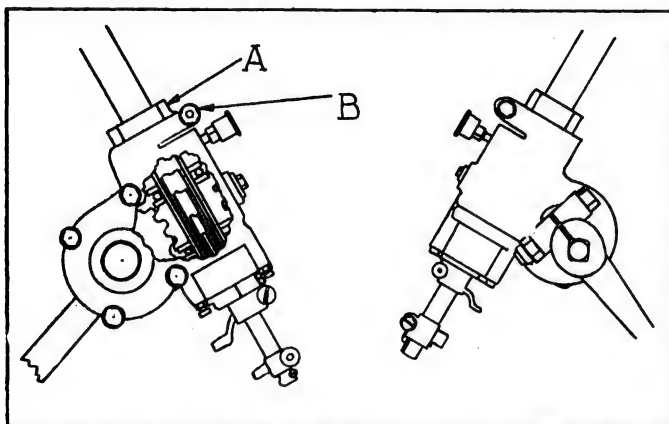
Will you please give me directions for adjusting the steering gear on a Studebaker 1916 car series 17? There seems to be quite a little lost motion, which is evidently in the housing at the lower part of the steering column. What is the construction of this type of steering gear?

The type of steering gear which you have reference to is of the worm and wheel type, the worm being on the steering column and the worm wheel fastened to the steering arm.

Lost motion may be taken up by loosening the adjustment nut clamping bolt B, as shown in the diagram attached, and turning the adjusting nut A in a clockwise direction, or toward the right until it brings up against the ball bearing. The greatest of care should be used not to tighten this nut too tightly, since it will cause a bind in the steering column.

If this adjustment does not completely remove the play it is an indication that the worm wheel is worn. The extreme positions of the wheels do not cause the worm wheel to turn but about one-fourth of its circumference, there are, therefore, four positions of the wheel possible before it is entirely worn out.

Remove the steering arm from the square worm wheel



Studebaker Steering Gear: A, Adjusting Nut; B, Adjusting Nut Clamping Bolt.

shaft and turn on the steering wheel until the worm wheel shaft has turned one-quarter of a revolution, then replace the steering arm. This will bring a new portion of the worm wheel into contact with the worm.

GRAY & DAVIS SYSTEM.

(F. R., New York, N. Y.)

I have a Gray & Davis two unit starting and lighting system on my Ford car and would like to connect an ammeter in the system to show the charge and discharge of the system. Can this be done so that it will not show the starting current used and where is it connected? How large should the ammeter be?

You may connect an ammeter in the circuit as hereafter directed and it will show only the current used for lighting. The ammeter should be of the zero centre type and indicate "Charge and Discharge" up to at least 25 amperes.

Connected with the starting switch there are three wires, the first goes from the switch to the starting motor; the second from the switch to the negative battery terminal, and the third from the same side of the switch leads to the lighting switch. The latter wire on the original installation was covered with green and red covering and this wire should be cut, and each end connected with an ammeter terminal. With the engine stopped and the lights turned on the ammeter should register "discharge;" if it reads "charge" the connections should be reversed.

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Service Stations in Every State

TIRES GUARANTEED

50 to
75%
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Compare These Prices:

Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$6.10	\$2.35	33x4	\$12.00	\$4.20
30x3	6.50	2.40	34x4	12.90	4.30
30x3 1/2	8.25	2.85	35x4	13.00	4.45
31x3 1/2	9.00	3.00	36x4	13.50	4.55
32x3 1/2	9.50	3.10	34x4 1/2	14.00	5.40
34x3 1/2	10.00	3.30	35x4 1/2	14.50	5.55
30x4	10.00		36x4 1/2	15.00	5.80
31x4	10.80	3.80	37x4 1/2	15.50	5.90
32x4	11.00	4.05	37x5	17.00	6.75

New illustrated catalog will tell you HOW. Send for it now. OUR TIRES are practically puncture-proof and blow-out proof. Guaranteed for 3500 miles. Your old tires taken in exchange.

Prices same for Plain and Non-Skid Treads.

Tires are sent subject to examination.

C. O. D. Shipments. 10 per cent. deposit required.

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NEW YORK CITY

Inter-State

FIVE BODY STYLES

\$850 to \$950

Springfield Touring Sedan—\$1325

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Write today for complete catalogue and territory information.

Full line of export models for foreign markets. Prices on application.

Inter-State Motor Co.,

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FREE TOURING MAPS



**CHECK MAPS DESIRED
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TIMES BUILDING, PAWTUCKET, R. I.

HIS ENGINE SKIPS.

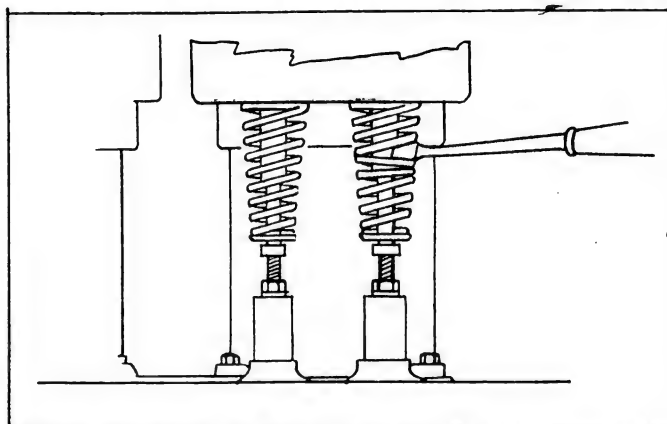
(A. E. S., Chicago, Ill.)

I have recently been badly troubled with a skipping engine and I have tried every means to remedy the trouble but cannot. The skip is not regular, but the engine will run for a few minutes, then skip for three or four explosions, then run all right again. I have gone over the electrical wiring and am sure that there is no grounded or broken wires. Can you tell me what the trouble might be?

You must first determine whether the skip can be located in one particular cylinder or effects all cylinders. If your car is operated on coils with vibrators, as is the Ford, you may be able to locate the skip by starting the engine and pressing down upon each vibrator tongue in succession until one is found that eliminates the skip. If this test is insufficient, hold down the vibrator tongues on coils one and two, then one and three, then one and four, then two and three, and so forth until every set of two cylinders has been tried. A regular skip in either of the cylinders can be located in this way, for with but two vibrators working the misfiring of either of these two cylinders is immediately noticeable.

If the car is not equipped with vibrating coils the plugs of one, two or three of the cylinders may be short circuited by attaching a heavy wire to the engine base and connecting it with the plugs that are to be short circuited. The cylinders should all be tried as they were with the coils.

A skip that can be located in any one cylinder may be due to valve air leakage, or ignition trouble, but is seldom due to carburetor trouble. A skip that effects all of the cyl-



Testing the Valves by Means of a Screw Driver Between the Coils of the Valve Spring.

inders intermittently may be due to ignition, valve air leakage or carburetor trouble.

If you should locate the skip in one cylinder, examine the secondary wire and be sure that it neither touches a metal part of the engine or is broken inside the insulation. The easiest test for faulty secondary wiring is to install a temporary length of new wire, removing the old wire for the time.

Should the secondary wire be all right, transpose the plugs of the skipping cylinder and either of the other cylinders. If the skip goes with the plug, a new plug will remedy the trouble. If the car is fitted with coils the coils should be transposed, and should the skip follow the coil the coil is faulty.

The best way to adjust the coil is to remove it from the box and test it with batteries. Under ordinary conditions a coil should give at least 3/16 of an inch spark. One primary connection is made and a hammer or piece of metal placed about 3/16 of an inch from the secondary coil terminal. When the other primary connection is made a spark should pass between the iron and the coil terminal. The coil may be adjusted by the vibrator adjusting screw and if adjustment of the screw is impossible it is an indication that either the vibrator points are damaged or worn or that there is a break in the coil or condenser.

Vibrator points should be carefully smoothed over with a very fine piece of emory cloth. The greatest of care should be observed to keep the faces of the vibrator points flat, yet

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A

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CHAMPION IGNITION CO., Flint, Michigan, U. S. A.

not to cut off too much of the surfaces.

The repair of broken down coils or condensers is a factory job and cannot be successfully accomplished without proper tools and equipment.

After long use a valve spring is apt to loose its springiness and thus the valve action is impaired. A skip in one cylinder may often be traced to a weak exhaust valve spring. To locate such weakness, insert a screw driver between the coils of the spring while the engine is being run and expand the spring. Should the engine immediately speed up, and run evenly, the valve spring should be replaced by a new one.

The valve guides of the "missing" cylinder should be given a careful examination, as excess air leakage into the cylinder will cause a weakened mixture and consequent misfiring.

If the skip effects all cylinders, examine the breaker box or timer and be sure that all primary connections are electrically perfect. The possibility of broken wires inside the insulation in the primary circuit is also to be considered. All of the coils should be carefully tested and their connections inside the box examined. Loose binding posts often cause considerable trouble.

The carburetor manifold should be carefully examined, both where it is joined to the engine and at the carburetor. A leakage at either of these points means a poor mixture, causing a skip.

A clogged fuel intake line, or poorly vented tank, both result in a skipping engine. Pieces of packing often lodge in the fuel line, forming valve like shut offs, which are hard to locate, since the gasoline will seep through them, yet not run in a sufficient quantity to keep the engine supplied.

Water in the gasoline, or dirt in the carburetor will cause trouble. The best remedy is to disassemble the carburetor and clean it thoroughly.

Since you did not tell us the make of your car we cannot give you the carburetor adjustment. We would suggest that you be sure that it is properly adjusted before you try to locate the trouble.

DIRECTIONS FOR CLEANING BATTERY.

(R. G., Boston, Mass.)

I should like to clean out my storage battery because there is quite a lot of sediment in the bottom—so much in fact that I am afraid of short-circuiting the plates. Can I turn the battery upside down and pour out the electrolyte and sediment without damaging the battery?

The turning of the battery upside down to remove the sediment would not be practical and would probably be very injurious to the battery. The sediment of which you write is lead peroxide that has been "shed" from the positive plates and precipitated.

If the battery were inverted to pour out the electrolyte the sediment would be washed between the plates and separators and around the plates so that short circuits would result. No washing that would be practical would insure the removal of the particles from the plates, and in the event of renewal of the electrolyte, particles remaining on the plates would result in local action—each particle having a polarity opposite to that of the plate on which it would be fixed, and forming in each instance a miniature cell in which charge and discharge would alternate, as between positive and negative plates. Eventually holes would be pierced in the plates from this action.

There is but one way to clean the sediment from the cells, and this work is not often undertaken by one not experienced in battery repair. It is the removal of the plates from the cells, thoroughly washing the plates and jars, renewal (if necessary) of the wood separators and reassembling.

Before this is done the battery should be fully charged, which means that it should be charged until there is no rise in voltage or specific gravity of the electrolyte over a period of half an hour.

The battery cells have two terminals each and these cells are connected by different type connectors, some being what is known as "bolted" and others being "burned." The process

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of "burning" is really that of fusing, and when the terminals are burned there is no joint, the metal flowing together.

In disassembling cells with burned connections of the pillar posts, holes are drilled with half-inch drills where the pillar straps are burned to the pillar posts, and the connectors may then be lifted off. Another method not so satisfactory is by cutting the connectors between the pillars with a hack saw.

Bolted connections may be unscrewed and require no drilling or cutting. If the tops of the cells are sealed with soft rubber gaskets, the gaskets may be removed and the covers taken off. If sealed with a hard compound the compound may be softened and removed with a heated putty knife.

When the elements or plates are exposed one series of plates should be removed at a time and placed on its side with the plates vertical. These can be washed with a stream of water and any deposit on the plates that the water will not remove should be scraped off with a stick of wood.

The wood and rubber separators should be removed, and if they are cracked or broken or rotted they should be replaced with new, otherwise they may be used again.

Immediately upon washing the negative plates should be placed in distilled water, for if exposed to air they will absorb oxygen and heat, and if the battery is not to be immediately reassembled they should be placed in electrolyte. The positive plates will not heat when exposed to air.

Assembling the battery, assuming the jar and the separators of each cell have been thoroughly cleaned, the element is placed with a positive plate between each negative plate, and the separators are placed with one rubber and one wood between each plate. The rubber sheets contact with the positive plates and the flat sides of the wood separators contact with the negative plates.

The bottoms of the plates and separators should be even. The plates and separators should be pressed together and squared with each other so that the assembly can be placed in the jar and seated on the bridge at the bottom. The hold down, the rubber or wooden pieces that were between the tops of the separators and the straps connecting the plate lugs should be placed, the purpose of these being to prevent the separators rising and insuring against short circuiting at the bases of the plates. The covers of the cells are then put on and resealed.

The electrolyte should be placed in the cells before the covers are put on and this ought to be about 40 points higher in specific gravity than the electrolyte that was in the cells before they were disassembled. This increase of gravity is to compensate for the water in the wood separators. If the old wood separators are used, however, the specific gravity should be the same.

New electrolyte can be made by mixing chemically pure sulphuric acid, 1.842 density, with 4% parts of distilled water by volume to obtain 1.200 density, and one part of acid to three parts of distilled water to obtain 1.275 specific gravity. When mixing pour the acid slowly into the water, stirring it thoroughly with a wooden or glass paddle. The solution will heat when the acid is mixed and the final reading must be made when it has cooled. The mixing must be done in a glass or earthenware vessel. If the plates have been kept wet there will be no rise of the temperature of the cells when the electrolyte is poured into them.

After covers have been put on the cells may be temporarily connected. The plates and wood separators will absorb some of the electrolyte, so this must be observed to see that the plates are well covered.

The greatest of care must be observed to connect the positive poles of the cells with the negative poles of the adjacent cells, leaving a final and outer positive and negative terminal for the line connections.

The connections must be either burned, or if the bolted type, the pillars, connectors and nuts must be coated heavily with vaseline to prevent corrosion.

The battery must be then fully charged and the electrolyte brought to the required specific gravity. The battery should then be charged at a rate not exceeding one-fourth of the normal discharge rate, and this should be continued until both the voltage and specific gravity reach a maximum, and to be sure that this maximum has been obtained the readings should be alike for a period of not less than 10 hours. There

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should be an allowance for temperature variation, for the specific gravity will decrease one point for each three degrees rise in temperature and it will correspondingly increase for each three degrees fall in temperature.

The maximum gravity will be approximately 1.280 at 80 degrees Fahrenheit, and the maximum voltage should be between 2.55 and 2.70. Upon completion of the charge the height of the electrolyte should be adjusted to be about one-half inch above the tops of the plates. The battery will not have its maximum capacity until it has been charged and discharged three or four times, when the specific gravity of the electrolyte should be adjusted to be approximately 1.285 when fully charged.

The restoration of a battery is a very delicate operation and in most cases it is most practical for the owner to have the work done at a battery station. Unless the most careful attention is given the work the results will be disappointing.

Giving the Used Car a Chance.

(Continued from Page 9.)

environment in his home to the satisfaction of all his family. Sunday no longer finds him sitting about the house all day and indifferent to his surroundings, but out in his car with his family, enjoying the refreshing air and country scenery. It is a new and healthy life that he has entered together with his family and they all become attached to the car regardless of his pedigree or embellishments. Here is a man that is getting all the fundamental pleasure and enjoyment that it is possible to derive from motoring.

He builds a garage for his car after finding that it is cheaper and more convenient than placing it in the public garage and in his spare time becomes absorbed in the interesting work of caring for his machine, making adjustments, minor repairs and cleaning it up. In this process all the imaginary troubles that confronted him before he became an owner disappear and he is transposed into a motoring enthusiast with the assurance that he will remain one until his death unless misfortune overtakes him. Thinking of gears, transmissions, carburetors, magnetos and other seemingly mysterious mechanisms no longer baffles his reason, but serves to stimulate his interest and he will soon be talking "car" almost as fluently as he discusses his business.

And It Could Have Happened Sooner.

Here is an individual, now a potential part of the great market for motor cars, parts and equipment, that might have been a factor several years earlier had anyone taken the trouble to educate him up to the pleasures of motoring and to dispel his doubts regarding the operation and maintenance of a machine. His ignorance of the subject kept him out of the game and in all his visits to dealers he found none who understood his attitude so that they could apply the convincing argument that would make him a motorist.

The ownership of a car with him is now indispensable; he no longer looks upon it as an expense or possible waste, but goes to the other extreme in most cases and buys all the necessary accessories that he can afford. When he got his car it had been stripped of about everything except the necessary running units. For a time it proved satisfactory in this condition, but he soon learned to appreciate the value of a spotlight, an extra tire and rim, engine tire pump, one man top, self-starter and numerous other appliances that lessen the care and make more pleasureable the operation of a car.

With full equipment and a new coat of finish on his car he is still several hundred dollars in pocket and possesses the same value in a motor car that another owner who had purchased the same make and model of car new. His car develops the same speed, has the same riding qualities and he can tour as extensively as he wishes. When the time comes and conditions warrant the purchase of another car he will probably want a new one and when he decides to act on this desire he will no longer haunt the salesrooms, using up the dealers' time and causing them untold disappointments, but will buy quick.

This suppositionary case reveals a factor in the motor trade that has too long been overlooked and one that must receive immediate attention to bring about a more healthy condition in the market for new cars.

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Friction starts Grinding before Grease begins Lubricating

Common grease needs heat to soften it before it can lubricate. The parts grinding together must furnish this heat in the shape of friction. Meanwhile these parts get no lubrication. And Friction—getting a good start—is never caught up with by grease.



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NON-FLUID OIL lubricates the second your car moves from rest—and every minute it is in motion. Doesn't give friction a chance to start. It never melts, never leaks out, is much purer and longer lasting than any grease you can buy.

If you buy lubricants on the same basis that you buy tires—purely on service, you'll ask for NON-FLUID OIL every time. Get "K-oo Special" grade for gears; "K-ooo" grade for bearings. Sold at your dealers in orange-colored cans only.

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The Winton Six is a car of high ideals. Every ounce of material and every stroke of workmanship in it are honest. It is made by artisans encouraged to excel. It is made for men and women who love and value sterling worth in manhood, in womanhood, and in the things that make living so delightfully worth while. It is made for you.

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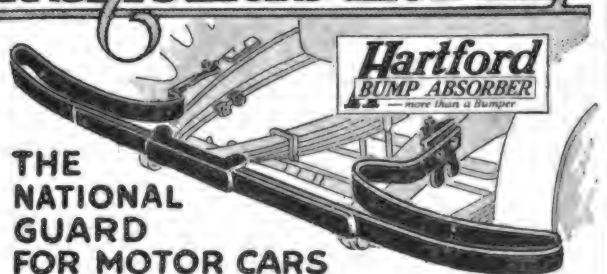
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He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

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LUBRICANTS

BE PARTICULAR

Avoid inferior lubricants and use the ones that give 100% service. Banish metal-to-metal contact—the source of Friction. Write for booklet No. 210-G.

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JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

It is foolhardy to knock a used car, as it only serves to place the prospect on his guard or cause him to have misgivings about the whole business. If he can't see his way to the purchase of a new car the dealer should attempt to discern the reasons for his attitude and work on them, not give him up as a poor prospect or time waster. The merit of the used car should be explained in detail and even advocated as a machine with which the prospective motorist should make his initial effort, as there are thousands who will come into the motorists' realm if they are taught to creep, so to speak, before they are asked to walk.

Every additional motorist means stimulus to the garage and dealers' business and also forms the nucleus of a demand for more cars which will materialize from year to year. All the big successful dealers in the country who have endured have founded their success largely upon the policy of devoting time and energies to prospects and giving them service. In this respect the business contains no elements foreign to the banking, merchandising business or professional callings.

RESTORATION SURVEY OF THE CHEVROLET.

(Continued from Page 16.)

the king pin, and if there is play, either the bushings should be replaced or both the pin and bushings replaced.

The electrical system is necessarily more complicated than that of Ford cars for the reason that not only is it an ignition, but a starting and lighting system combined. As a general rule the generator or starting units require no attention beyond oiling and exterior cleaning, and should serious trouble develop in either unit it should be sent to a branch station or the factory for repair.

Before putting the starting motor into place the teeth on the pinion gear, as well as those on the flywheel, should be thoroughly cleaned and examined for breaks or badly worn teeth. The pinion gear on the motor should be oiled or greased so that it will turn easily on the motor shaft.

All wiring connections should be made as shown in the accompanying diagram. The connections and terminals should be scraped so that the electrical connection will be positive. The whole wiring system should be carefully examined and frayed wires either replaced or thoroughly insulated with electrician's tape.

Retiming the Engine.

If care has been used in reassembling and meshing the timing gears, the timing wires need not be changed. Should the engine require retiming, however, the following directions should be observed:

The timer and distributor unit should be assembled and the wires connected with the distributor. The secondary wire from No. 1 cylinder should be connected with the terminal which is nearest one when standing at the side of the engine. The terminals should then be connected in a clockwise order as follows: 1, 2, 4, 3.

The crankshaft should next be revolved with the hand crank until the piston in No. 1 cylinder is at the extreme top of the firing stroke, which can be determined by inserting a piece of wire in the spark plug hole. The spark lever should then be connected with the distributor body and set at about one notch advanced.

The two wires to the breaker box are now connected and the secondary wire from No. 1 cylinder slipped from the distributor terminal. Turn on the ignition switch and turn the timer distributor shaft clockwise (the lock nut of which has been loosened), holding the secondary wire near to its distributor socket. When the shaft has been turned to a point where a spark passes between No. 1 secondary wire and its distributor socket, the lock nut on the shaft should be tightened and the setting is complete.

It is always a good plan to check the timing as follows:

After the engine has been timed as above, turn off the switch, remove each spark plug, and with each secondary wire connected put the plugs on top of the engine. When the engine is cranked with the hand crank, a spark should be formed at each plug with the ignition switch on. Turn the engine over slowly until the spark begins in No. 1 plug. The piston should be at the top of its stroke and both valves should be closed. If it has not reached the top, or has passed over the top, the timer shaft should be reset as above directed.

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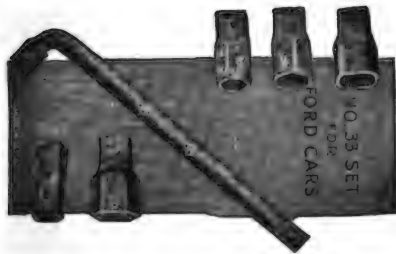
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If your dealer cannot supply you we will ship prepaid on receipt of price.



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Your copy of complete Mossberg Tool Book No. 191A if you will send address.



No. 645, Reverse and Brake Pedal Tension Spring Wrench. The only practical wrench for this work. Each, 50c.



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Polarine minimizes friction, saves gasoline, and keeps all the power turning the shaft.

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VOL. LXIV.

AUGUST 25, 1917.

NO. 2.

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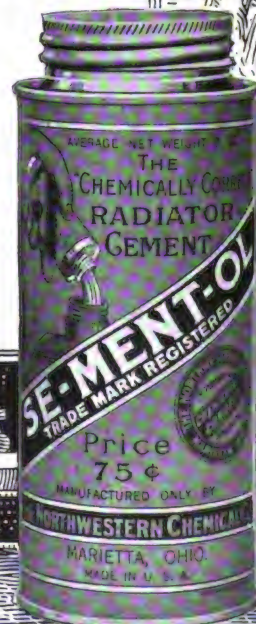
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SE-MENT-OL is a dry powder. Dissolved in the hot water of your radiator, the cooler air at the edge of the leak quickly congeals it into a permanent repair. In all parts of the cooling system except at the leak, it remains in solution until the radiator has been drained and refilled. Your radiator is therefore clean after using; besides being in perfect repair.

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Joe Dawson, in a Chalmers stock chassis equipped with A-C plugs, covers 1898 miles in 24 hours, averaging 79.08 miles per hour.

It is interesting to note that A-C plugs are standard equipment on all Chalmers cars, so that every Chalmers owner and every owner of a car equipped with A-C is assured of maximum spark plug efficiency.

Look under your hood, and if the plugs do not have the letters "A-C" on the porcelain, get a set from your dealer. You will be more than repaid by the improved performance.



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Transmission Linings for Fords

Fastest selling accessory
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\$3 per
Set of 3

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They Make the Ford Brake **BRAKE**

YOU know how the Ford jumps when it starts, and jerks when it stops—how it shivers and jars every time the brake goes on. Here is something that puts velvety smoothness in the Ford Transmission, so that it goes into low or reverse like a high-priced car. It starts gliding to a quiet stop at the first touch of the toe on the brake. No more chatter, no more jar—regular big car stuff.

Ordinary transmission fabric becomes glassy surfaced and hard and does not grip unless excessive pressure is brought to bear. Then it suddenly grabs and slips—causing jars and the mechanism-killing vibration. The corks in Cork Insert Linings eliminate the slipping, the jarring, the vibration, of starting and stopping. In addition Cork Inserts outlast two to three sets of ordinary linings.

Get Cork Inserts, Now, Dealers!

Cork Inserts (both Transmission Linings and Fan Belts for Fords) are being advertised to your trade in the Saturday Evening Post and leading trade papers. They are selling by the thousands. Your customers know about them and are ready to buy as soon as you are prepared to sell them. They

give better service with increased economy. Use the coupon and send your order today for Cork Inserts. Your jobber will get full credit.

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Send by express, subject to regular dealer discounts, the following:

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Most motor troubles are caused by overheating. Overheating would largely be avoided if the fan were kept fanning by a belt that didn't slip. The slipping of the ordinary Ford Fan Belt runs between 25% and 50%. It's bound to get slippery from the soaking in oil and water and the polishing action of service. Cork Insert Fan Belts

Keep the Motor Cool —They Don't Slip

Corks are inserted into high grade, water-proof oak leather, and backed by heavy water-proof fabric. The corks stop the slipping. They are unaffected by water or oil, grease or dirt. They retain their gripping qualities throughout a service several times as long as ordinary belts.

\$1 for
1917 Ford

—85c for
earlier
models



Keeps the
fan fanning
— keeps the
motor cool

Ford Owner Coupon

Advance Automobile Accessories Corp.,
Dept. G 3-1 56 East Randolph St., Chicago

Enclosed find \$.....

- Send me () 1 set Cork Insert Transmission Linings, \$3.00
() 1 Ford Fan Belt for 1917 Ford..... 1.00
() 1 Ford Fan Belt for 1916 or earlier Ford models..... .85

Name.....

City.....State.....

Dealer's Name.....

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INDEX TO ADVERTISERS



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

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NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

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New 30x3½ Non-Skid

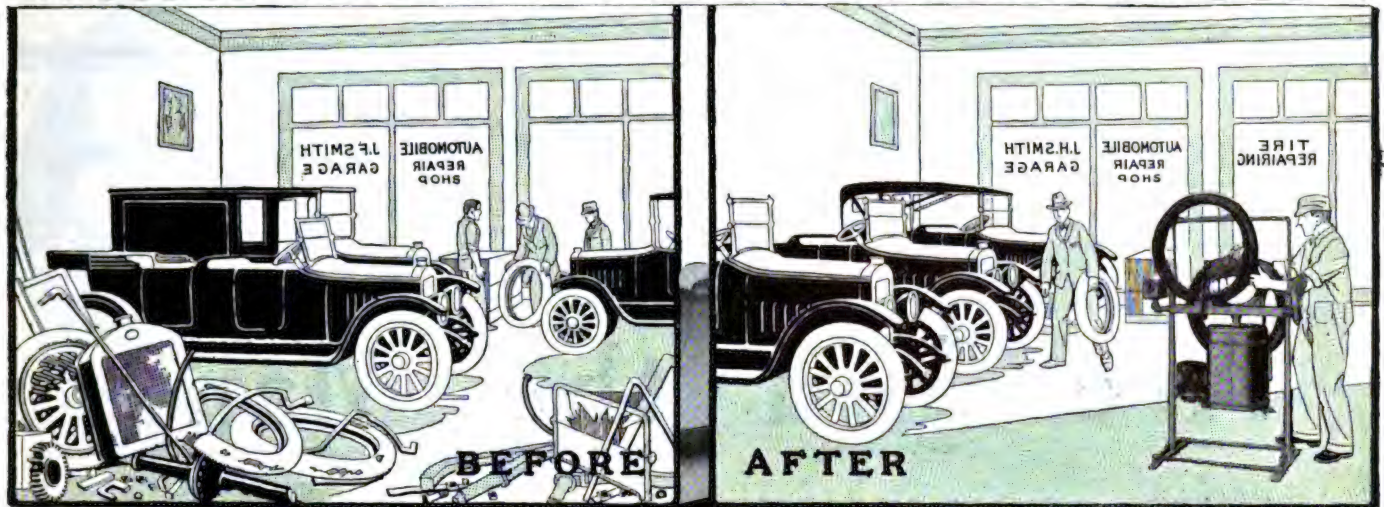
\$7.50

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Handsome Registered Chow Pups at reasonable prices. Pups of our breeding were awarded first and second prizes at four large shows this spring, viz.: Belmont Park, Mineola, White Plains and Greenwich, Conn. **SOUTHWOOD KENNELS**, Tivoli, N. Y., Dutchess County.

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Do you pay rent on the space junk occupies? Better a thousand times to sell the metal for old iron—the rubber for old rubber—and utilize the space to produce dollars.

To be efficient—to make profit—you must use every facility at your command. You cannot waste space any more than you waste your time—it's all money. Better turn the junk into cash and get one of

HAYWOOD'S Model D.B. VULCANIZING PLANTS

The plant will earn every dollar it costs almost any week—every week, if you have the right push and energy. Every customer whose car you now store will let you repair his tires—keep them in order to increase the mileage 25% to 50%. Could you want a better opportunity? Men are getting rich in the garage business, who understand the game—who permit no leakage—no waste of space—who use every bit of energy for dollar making. Why shouldn't you? Every owner who has tried it thought he had no room, but there *was* room, and more money in his business, which we helped him to find

Only \$45 Complete

A WONDERFUL PLANT

This Model D-B Vulcanizing Plant is small, compact, especially designed for garages. It will handle almost any kind of repair on casings or tubes.

THE PRICE IS LOW

The price is extremely low—only \$45. It is convenient—quick—positive—certain and will earn more money than any other thing you can put in its space.

THE PROFITS BIG

There is almost no limit to the profits—it all depends upon the time you can give it—we teach you the whole business when you buy a machine. Its operation is simplicity itself—anyone can operate it without any special training—our splendid book of instructions makes it all perfectly plain and clear.

WRITE TODAY

Don't put it off—get complete information and name of our nearest jobber. You should know about it, whether you buy a plant or not. Fill out the coupon.
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A BUSINESS OPPORTUNITY COUPON
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Dear Sir—Please send full details of the Haywood Model D-B Vulcanizing Plant.
Name
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(When Writing to Advertisers, Please Mention The Automobile Journal.)



Are You the Man?

We are looking for one man, a man of exceptional ability and initiative. Some one man, above all others in every community, has the particular ability we seek. When we find him, he will immediately begin to build, with our aid, prestige and profit for himself.

He will be the highly capable representative of a highly capable motor truck. Little Giant.

He will be backed by a world-spanning organization, that has 23 years' reputation and experience in the building of engineering tools and machinery. He will be backed by the record that thousands of their trucks have made in over 175 varied types of business endeavor. He will be backed by the proof of service that many of these trucks have given for over nine years. He will be backed by intensive

local newspaper advertising over his name, in his territory. He will be backed by a truck, whose specifications set so high an efficiency standard, that it represents the most desirable hauling-equipment purchase that can be made by men who have things to move. He will be backed by a complete line—1-Ton, 2-Ton, 3½-Ton, and Convert-a-Car (Ford truck unit); and their extra exclusive cost-cutting feature—the Duntley Hydro-Pneumatic Gas Generator, which burns half kerosene and half gasoline, cutting fuel cost in two.

Write today, or better still, telegraph your belief that you are the alert, progressive, capable man we want; that you can ably represent in your community the Little Giant Trucks with the habit of heavy performance. Made that way by the \$14,000,000

CHICAGO PNEUMATIC TOOL CO.

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1615 Michigan Avenue, Chicago

(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Dominant One-Ton Truck Unit



Announcing

The Dearborn Universal One-Ton Truck Unit for All Cars

A bigger, more profitable money maker for dealers.

A One-Ton Truck Unit that fits *all* cars and made by a strong company, whose success in building Truck Units has been demonstrated nationally.

With the new Dearborn Universal Truck Units you can profitably solve the Used-Car problem in your locality. Convert these cars into trucks. For cars with larger horsepower use the *new* Dearborn Universal Two-Ton Truck Unit.

\$350
and up

One or Two-Ton
DEARBORN
Truck Unit

\$350
and up

All Dearborn Truck Units are designed so that 90% of the load is carried on their heavy Dearborn Rear Axles, Heavy Springs and Heavy Pruden artillery type Rear Wheels, with guaranteed hickory spokes and felloes.

Bock Heavy Duty Roller Bearings, Baldwin Roller Chains, Baldwin Steel Sprockets, Jack-Shaft Hangers and Back-Rod Hangers HOT riveted to frame—not *merely* bolted.

Wire or write for Dealer's Big Money Making Proposition.

Dearborn Truck Co.
1262-74 S. Campbell Avenue
Chicago

A MONEY MAKER

(When Writing to Advertisers, Please Mention The Automobile Journal.)

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Canada, \$2.50 a year.
Foreign Countries in Postal Union, \$3.50 a year.

AUTOMOBILE JOURNAL

Remittances:

Should be made by Check, Draft, Postoffice or Express Money Order, or Registered Letter. Money enclosures must be at sender's risk.

Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879

Ten Cents
a Copy

THE car owner will find in this issue of the magazine information of practical worth from the frontispiece, with its serviceability argument to the novice, through the special treatment and disassembly of a popular car, to find on the last advertising page. There is reason to all things and there is exceptional reason in this era of critical trial for the automobile that its exact standing shall be determined and fairly determined in the house of its friends. The dependence of the generation has passed decidedly from the horse to the automobile. It is not on test in any sense as to its fitness for survival as the great mainstay of road transportation. The ordeal for cars today is simply to stand up until owners, dealers and manufacturers perfect complete trade organizations and trade practises that will give the vehicles a fair chance for their inherent values. The manufacturers require to be kept in immediate touch with the motoring public. Some observers maintain that there is a large class of distributors whose chief interest lies in sales and who are necessarily not so greatly in sympathy with users as the people who actually make the vehicles. The user, in the last analysis, must place all his dependence in the machine. The value that is in it is exactly what there is, for buyer or seller, to trade on, and so a sliding scale based on the year of its make is worthy of absolutely no reliance, is no wise a help, and should be abolished.

THE more the used car problem is studied, the more apparent does it become that united trade and owner action is essential. In a forthcoming issue soon the Automobile Journal will present facts on the used car problem and discussion of this view. Every motorist has a great deal at stake. Send in your opinion.

XLIV.

AUG. 25, 1917.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and
25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

Times Building, Pawtucket, R. I.

PATRIOTISM, with a good many people, stops short of practical sacrifices that will help win this war and decide that the world shall be safe for democracy. One of the sacrifices which hits our 100,000,000 people in the same vulnerable spot is that which calls for food conservation. The bureau of trade and technical press publicity in the department of food conservation administered by Herbert C. Hoover seeks to enlist the men, women and children who must be reached, not once, but several times as willing volunteers through the periodicals they read. The campaign is launched to conserve food, fuel and power. All motorists, as well as all readers of this magazine engaged in the automobile industry in any capacity, use, more or less, all three of these elements. If each will but remember that they must not waste any of these precious things, many thousands of units of each will be able to be diverted to people of the allied countries, whose need is very great. This is a land of plenty and generous abundance. The call is not interpreted to mean that persons shall go without food, fuel or power. But if each cuts their allowance to an extent that they feel it, know they are doing it and are able to make an appreciable accounting of it, they will be "doing a bit," and it will mean more of the sinews of war supplied to the brave fellows who go "over the top" in Trenchland for the glory of the Stars and Stripes and the salvation of mankind. Have a wheatless dinner and a meatless day. Don't waste gasoline. Get more done in a normal mileage than ever before.

IN THE Idea Exchange of this issue there is announcement of an added reward for the best topical letters. The subjects bear on practical information that one motorist will tell another every time they have the opportunity.

Do You Want Foreign Business?

THE motor vehicle market of the world is open to all advertisers in the *Automobile Journal*. Makers of pleasure cars, trucks, parts, fittings, supplies, accessories, electrical equipment, tools and machinery have equal opportunity to benefit.

8000 Foreign Trade Buyers

— In —

85 Foreign Countries

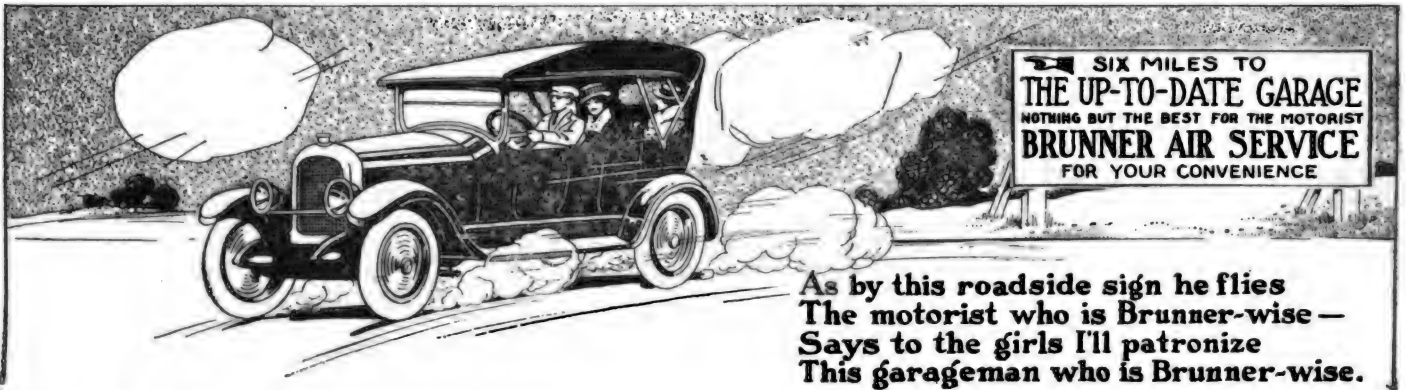
The simple, practical, sure and economical channels through which to reach all jobbers and large dealers in a world wide market is afforded.

The time to start to secure this business is now.

DETAILED INFORMATION AT REQUEST

Automobile Journal Publishing Company

Times Building, Pawtucket, Rhode Island



MR. GARAGEMAN, is your garage up-to-date? Are the Brunnerwise Motorists spending their money with you; or are they spending their money with the Brunnerwise Garageman down the line away who advertises the fact that he is supplying prompt and efficient service by displaying the Brunner sign on his garage?

If your business is not so large but that you could handle some more, Mr. Garageman, you should investigate Brunner service.



The Brunnerwise Motorist is a most discriminating individual; he appreciates good service and he knows prompt and efficient service always awaits him at the door of the garage displaying the Brunner sign. He is a liberal spender and spends his money with the Brunnerwise Garagemen who show him that they have his interests in mind by installing Brunner service.



The Brunnerwise Garageman is reaping the benefit of the good advertising derived from the Brunner Sign, for his garage is the stopping place of the Brunnerwise Motorist who always patronizes the garage displaying the Brunner sign, because he knows he can depend on real service when he stops to trade with the Brunnerwise Garageman. Are you Brunnerwise?

INVESTIGATE THE **BRUNNER** AIR COMPRESSOR

Be honest with yourself and investigate the garage air compressor question thoroughly before deciding on your new equipment. The Brunner will stand investigation and the more thorough the investigation the more certain will be your decision in favor of Brunner Service, because it not only insures compressed air efficiency of the very highest order, but it also insures that very desirable and liberal patronage of the Brunnerwise Motorist, which follows the Brunner Sign.

We will be glad to send you the name of the Brunner Jobber who covers your town, also our catalogue and Garageman's Handbook on Compressed Air—a book which every garageman should read carefully. They are all free for the asking.

BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
UTICA, N. Y.

Cincinnati Branch:
CINCINNATI, OHIO.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

The Automobile Journal

VOL. XLIV.

AUGUST 25, 1917.

NO. 2.



How to Overcome Set Prices by Showing the Real Merits of a Substantial Used Car

False Depreciations Are Unable to Stand Up Against the Logic of a Vehicle that Will Show a Service Life of Eight to Ten Years and 100,000 Miles of "Go" In It

"WHOWER heard of a second-hand horse," said the car dealer in the used car department to a prospective customer who was in hesitancy owing to his prejudice against used cars.

This was the dealer's opening shot in placing a series of arguments in behalf of the merits of a substantial used car his customer had set his eyes upon. Continuing, the dealer said:

"The service a horse renders for his owner is the same as that given by a car, and the horse's value often becomes increased as it passes from one owner's hands into another's, because its actual value in the eyes of the purchaser is based solely upon its worth as determined by the service it will give; then why should we arbitrarily set a price on a car according to its age and appearance? Why depreciate it 50 to 60 per cent., ignoring entirely the fact that its serviceability has not depreciated 10 per cent? Even a depreciation to the latter amount could be computed only on a basis of service extending over years, which would be remote in its actual ef-

fect on value, the loss not being felt until the owner was ready to resell."

"Just what elements were injected into the situation so to influence people in appraising the value of service it is difficult to determine. Unless artificially created, aside from sentimental grounds, there could not possibly exist any such discrimination in an evenly balanced judgment."

"It would be next to an impossibility to determine an actual gauge for depreciating a car, and I know of an instance to prove it."

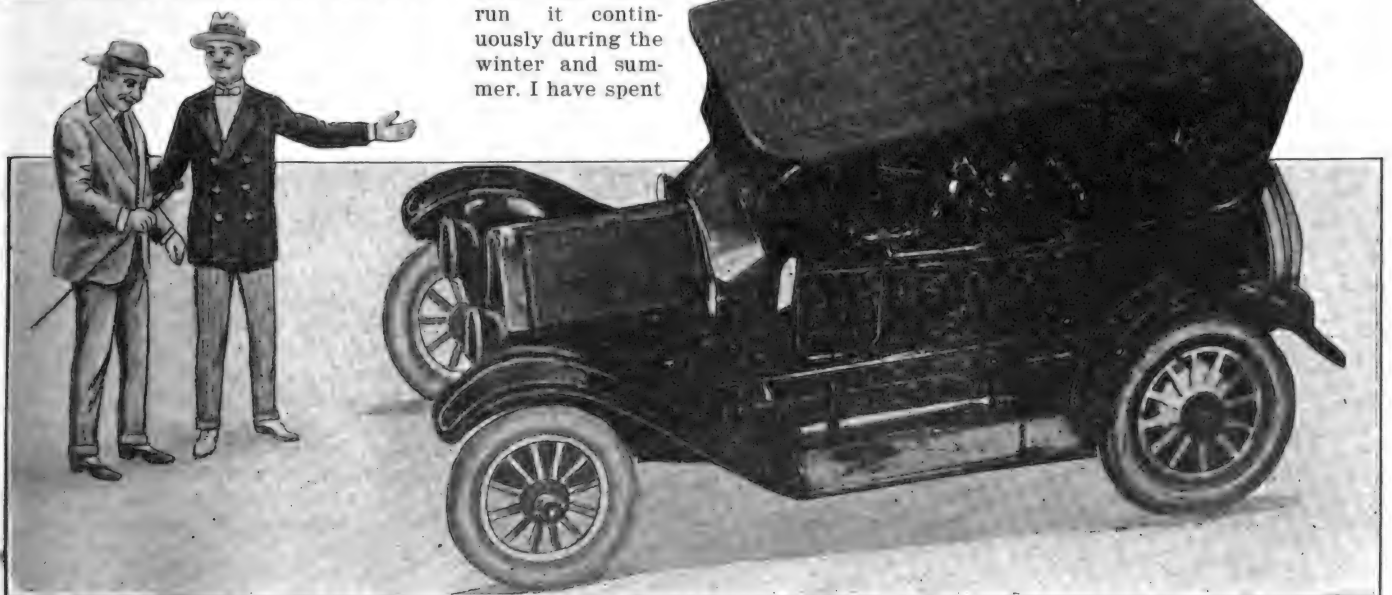
The dealer here produced a letter written by a motorist of many years' experience who frankly answered an impartial inquiry as to the service rendered by his car. In part the letter was as follows:

45,000 Miles of Satisfaction.

"Would state that this is my second car. I purchased it in July, 1912, and have run it continuously during the winter and summer. I have spent

about \$18 in replacing new parts. I consider my car as good today as the day I purchased it, for actual use, and if I was to buy a new car tomorrow I would certainly buy a —."

Resuming his argument, the dealer said: "Here is a car that has been running five years, has a record of having given 45,000 miles of faithful service and satisfaction to its owner and there is the owners' own testimony that it is still giving satisfaction and in his estimation is as good as the day he bought it. According to the individuals, bodies or publications who are attempting to create a false depreciation, of course that car in 1913 would only have been worth about 50 per cent. of its original value, 40 per cent. in 1914; 30 per cent. in 1915; 20 per cent. in 1916, and worth its junking value at present. We don't have to go beyond this letter, which is similar to



Dealer—"Whoever Saw a Second Hand Horse? * * * "We Don't Sell Any Cars from This Store That Have Any Mechanical Imperfections or Broken Parts."

What Set Price Doctrine Has Done

The Automobile Journal maintains that the false doctrine that a price is set on a used car by the mere fact that it was made in a certain year has the following effects:

That it threatens to produce stagnation in the motor car business, which, according to the authoritative statistics of the National Automobile Chamber of Commerce, faces the necessity of disposing of eight used cars for every 10 new cars sold.

That it has allowed lack of knowledge, loose dealings and misrepresentations to create a prejudice against the buying of used cars.

That through it, dealers have missed the chance of making motorists out of thousands of persons able to buy cars.

That by deflating the value of their property, hundreds of car owners have been offended, injured and alienated from motordom.

That the substitution of undervaluation as an antidote for glaring overallowances practised in some quarters is a flat failure.

That it has deprived used car owners and new car owners of legitimate service.

That it is an undue and unnecessary influence restricting the market for cars.

That it is accountable for many unworthy suspicions lodged in the minds of persons in the market for vehicles.

That it has paved the way to easy profits for scrap dealers.

thousands of others that could be obtained, to find that, as the owner says, the car for all useful purposes is as good as the day he bought it. It is, we may be compelled to admit, somewhat out of date, and the finish is not as new as it was—but it is far from junk yet and might not be for another five years, and even then many parts could be reclaimed and sold at figures that would be many hundred per cent. above what the actual metal would bring as junk."

"For the sake of argument, however, we will assume that the car did bring junk prices after 10 years' service; we must admit that each of the 10 years the same quality and value of service was obtained from its operation, and we could justifiably fix the depreciation at 10 per cent. a year, which would still be high, as some value would be recovered in the junking process. We are now getting down to brass tacks.

"This car you are looking at cost \$1200 last year. I am offering it at \$840 and know that I can get that figure as soon as a man comes along who appreciates what constitutes values. It has been driven only 5000 miles in the hands of an average driver and is intact so far as all mechanical details are concerned. The motor generates as much, if not more, power than when new, as the piston rings were replaced with a leak tight type, the motor has been overhauled and the body revarnished.

"There is no question about the service it will render and if you are a 'stickler for looks,' why that can be obtained and its appearance put on a par with an even higher priced machine at a small outlay. You can supply it with a bumper, spot light, shock absorbers, rear tire carrier and other equipment that will greatly enhance the appearance and service value of the car for less than \$100 and then you wouldn't feel ashamed of it in any company. You haven't any big depreciation to worry about and you have a car that with normal care will last you many years."

"Many people prefer their old car to purchasing a new one, if it is of a good make, as they can easily have all the wearing parts replaced at a small outlay—much less than the outlay for a new car every five years—and experience a feeling of companionship toward it, as they have gone about their business and toured in it so long that any other machine would seem strange in their hands. Just how strong such a feeling becomes is known to many motorists, and is a fact which I have letters to substantiate."

"These letters show that an owner will develop real affection for a car he has used many years, a feeling akin to that experienced by a family that has had a horse for many years."

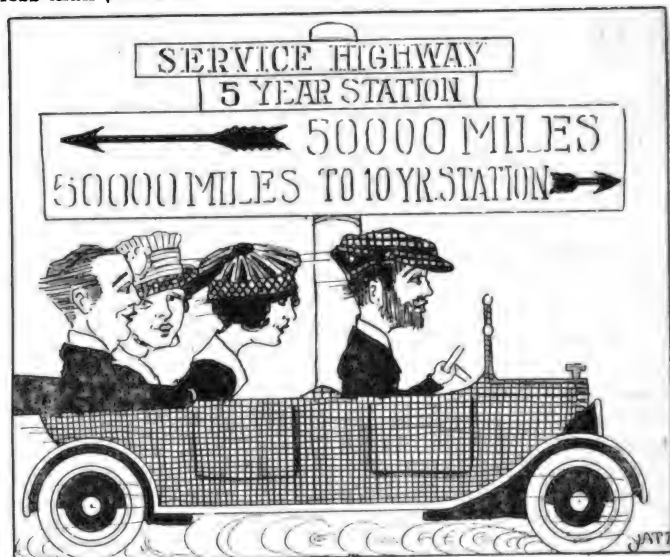
At this juncture the dealer produced

a list of owners showing the date they purchased their cars and the mileage covered. The list, which included 1 cars of as many owners, was as follows:

Car	Mileage	Car	Mileage
Purchased June 9, 1909	87,000	Purchased June 12, 1913	45,000
July 24, 1912	94,000	Dec. 24, 1914	21,628
April 7, 1911	45,000		1910 52,000
April 26, 1912	40,000	Mar. 2, 1913	50,000
July 27, 1912	45,000	Oct. 3, 1914	56,000
Mar. 21, 1911	28,347	May 23, 1913	90,000
Aug. 21, 1915	29,500	April 26, 1915	32,000
April 7, 1911	75,000	Mar. 16, 1914	48,222
Mar. 27, 1912	17,200	July 13, 1914	40,000

The first car on the list rendered its large mileage to a physician in Western Pennsylvania and the second one rendered its services to a business man connected with a corporation in a large city, also in Western Pennsylvania.

After the customer had expressed his approval of the list the dealer asked him if he doubted the service value of a car



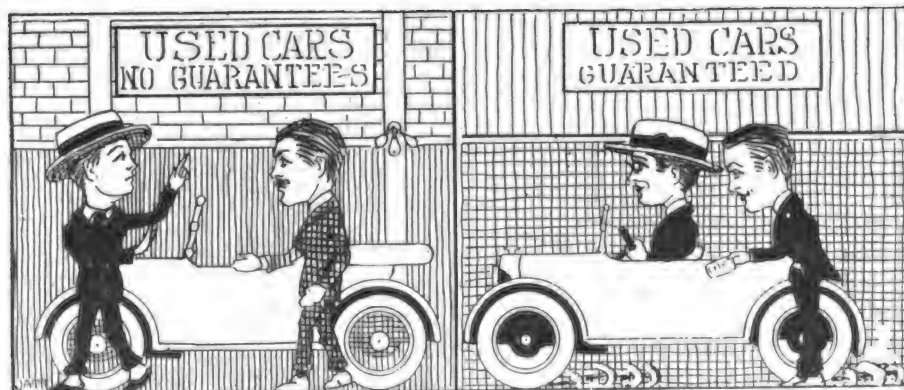
Substantial Cars Make the Half-Way Point in Service Life Showing Fitness for 100,000 Miles.

over a period of 10 years, mentioning that the average for each machine was about 50,000 miles, or an average of 5000 miles annually for 10 years, although some had been driven more and some less than that distance each year.

Unshakable Proofs of Serviceability.

"With the serviceability of the car thus proven beyond a doubt," said the dealer, "why should a person hesitate to pay up to within 70 per cent. of the car's original cost after it had been driven only 5000 miles. If a car has a potential serviceability measured in miles averaging, let us say, 50,000 miles, on what sophistry could a person base an argument to prove that the value of the first 5000 miles of service was worth \$600 and the remaining 45,000 miles was only worth the same amount. You can't hire a horse on any such basis or any other service performed. What kind of a proposition would it be to offer a man your horse for \$5 a day to drive five miles, and then turn around and offer it to him later for \$5 to use nine days and drive 45 miles."

"Here, then, we have what the old Roman logicians would have called a *reductio ad absurdum*. Put it into an



A Guarantee of the Car in His Pocket Means the Leaving of a Check in the Dealer's Hand.

equation and the ridiculousness of it is at once apparent:

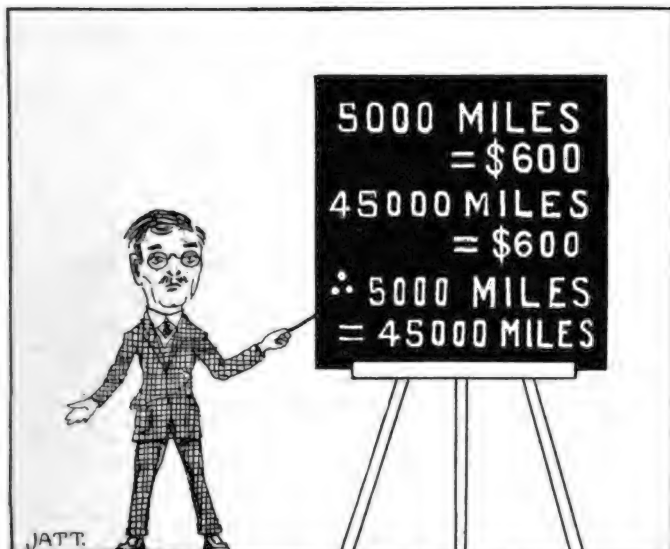
5,000 miles = \$600.

45,000 miles = \$600.

∴ 5,000 miles = 45,000 miles.

"I wouldn't attempt to refute your argument in favor of values," said the customer, "but I have heard that repairs ran up pretty fast on used cars and frequent replacements were necessary. Is that not a fact?"

"Well," said the dealer, "that is jumping to a conclusion not based on experience. It is much like accepting as a fact mere rumor like saying that Jones is a chicken thief when you never had any chickens or heard of anybody having any chickens that Jones could steal, or saw Jones carrying around any chickens. As a matter of fact such rumors or hearsays are usually based on the stigma that has been given the name of 'used car' to prejudice its value. What grounds have you to believe that because a car has been sold once that it would require or need any more replacements than one that has been in service for the same length of time with the original owner.



Set Price Car Depreciations Fail When They Try to Make One Equal Nine.

None at all except the prejudice inspired by the sound of that name 'used car.'

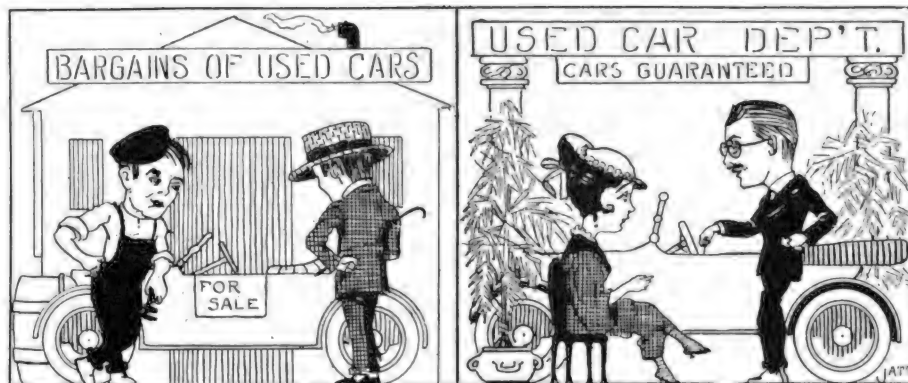
"I have just shown you a number of instances that such is not the case. One man only spent \$18 in five years on his car and there is no reason to believe that the car would have required any more expenditure upon it had it been owned by five different persons in that time than in remaining in its original owner's hands."

What Difference Who Owns the Car?

The dealer then produced another letter from a man who had driven his car 50,000 miles and his upkeep was only \$150. In displaying the letter, he said: "Is there, then, any reason for believing that if that man, instead of running his car five years, had sold it at the end of the first year, the new owner would have had to spend \$300 or \$400 on upkeep?"

Making the Sale.

The customer was on the point of admitting that he must have been misin-



A Modern Salesroom for Used Cars Is More Effective Than the Blighting Surroundings of an Old Shed.

formed on the subject of used cars, or else had allowed someone to create a false impression in his mind regarding them when the dealer, scenting the customary finale on the part of the average prospect, said: "Your attitude in the matter is not mysterious to me in the least. I have had hundreds of customers come in here in a doubtful mood, feeling as though they were bargaining for a pig in a bag. There is no mystery about a used car just because it is on its second sale. Many people think so, however, because they are inexperienced. Hence the only way they ever become convinced is to purchase one, and, after a short while, their doubts vanish so rapidly that they wonder how they ever came to harbor them. You probably are not aware that there are nearly as many users of so-called used cars in

the country as there are new car owners, and the majority are thoroughly satisfied owners.

"We don't sell any cars from this store that have any mechanical imperfections or broken parts that would cause a motorist inconvenience and trouble that he had no reason to expect," said the dealer, "and that is why we market several thousand used cars annually."

"Is that car there all oiled up and ready to start out?" asked the customer. "If it is I will take it."

As he pocketed the check the dealer chuckled to himself that pushing the sales of used cars wasn't so bad after all, as it had no demonstrations, trades or other features to mar it.

MECHANICAL AND EFFICIENCY EXPERT INDORSES APPERSON.

The Apperson Brothers Automobile Co., Kokomo, Ind., have reason to be exceptionally proud of a letter received

from Charles E. Torrance, the well known engineer, owing to the high praise in which he refers to their product. Coming from a mechanical and efficiency expert of the prominence that Mr. Torrance enjoys, his comment on the Apperson car is of particular significance.

Following is an extract from his letter:

"I am at present driving and own one of your standard seven-passenger, six-cylinder, 1917 model touring cars, and can conscientiously say that it is the finest and most satisfactory car I have ever driven. It has a wonderful reserve of power and I have yet to find a New England hill that I cannot take on high gear and accelerate on without the slightest difficulty. I am getting 900 miles to a gallon of oil, using Mobile Arctic, and my gasoline mileage is proportionately excellent.

PIERCE-ARROW EARNINGS \$2,317,562 FOR SIX MONTHS.

The Pierce-Arrow Motor Car Co. for the six months ending June 30, 1917, reports net earnings of \$2,317,562, or \$6.66 a share on the common stock.

What Recognition of Real Used Car Values Will Do.

The Automobile Journal asserts that closer attention to car conservation and the recognition of service value as the only reliable basis for used car prices will go far—

To dissipate the Used Car Problem.

To establish confidence in the consumers that they are getting genuine value for every dollar expended.

To elevate the plane upon which cars are exchanged and the used car business in general is transacted.

To benefit manufacturer, owner and dealer by restoring real business to all.

To make possible the selling of a used car with a definite guarantee.

To enlarge enormously the market for cars and create a much larger body of motorists.

To stimulate the demand for parts, replacement and accessories of all sorts.

To transform dissatisfied patrons into enthusiastic motorists all the time.

To educate the public to the true qualities of motor cars, their intrinsic initial worth, large mileage capabilities and endurance.

And, with the utmost frankness, place the used car business on a solid foundation.

ADVERTISED CARS SHOW BIG PRICE VARIATIONS

Set Price Idea on Used Automobiles Becomes Ridiculous in the Face of Values as Shown Constantly in Columns of the Daily Press

Ludicrousness of the set price idea for used cars becomes extremely apparent when taken up in connection with the advertisements of second hand cars appearing daily in the press of all large cities. One needs only to examine carefully these advertisements as reprinted in the Automobile Journal to discern the impossibility of a proposition to fix a price on the property of some one else. In the case of almost every car adver-

tised sufficiently wide discrepancies are found to show that a variation in price of from 10 to 100 per cent. exists, representing the difference of opinion among owners and their judgment as to what the car should bring if placed on the market.

These prices could not be said to represent a nominal value only, as while all the cars are not always sold at the figure asked, a good majority must be, or else such a uniformity in the asking

price could not continue to be shown from week to week. They do represent, however, the real market value of used cars, as while possibly in some instances a buyer could secure a reduction below the price asked, it is generally a rule that offerings are made at a minimum in order to facilitate the sale, a fact which is particularly true with those advertisements inserted by the used car dealers.

An American 6-cylinder 6-48 underslung (late model) touring car; fully equipped; shoes all new; many extras; cost \$4500; sacrifice if sold at once; \$425.

1916 ABBOTT-DETROIT.

Eight-cylinder, 7-passenger; only run 7000 miles; perfect throughout; repainted; cost new \$2000; mark down price, \$600.

1917 APPERSON CHUMMY, \$650.

Just like new; only run few hundred miles by present owner, who has purchased touring car; must be seen to be appreciated.

1916 APPERSON, \$650.

Eight-cylinder Chummy roadster; this car is in excellent condition.

1916 BRISCOE TOURING CAR.

New paint, good tires; just the car for salesmen; was \$475; now \$390.

1916 BRISCOE \$325.

Small five-passenger, electric starter and lights, wire wheels, recently painted; looks and runs good as new car; nice tires; fully equipped; a very cheap car to run; lots of power; must be seen to be appreciated.

BUICK for sale; 1917, Little Six, touring; excellent condition; good tires; two spares; price \$800.

1917 BUICK TOURING \$775.

Light Six roadster, in excellent condition and fully equipped; all good shoes and original paint excellent; light and inexpensive to operate and very easy riding; call for bargain.

1916 BUICK ROADSTER \$850.

Model C 55; original paint and tires perfect and mechanically perfect throughout; seats 3 and is a powerful, easy riding, quiet running roadster.

1916 LIGHT SIX BUICK ROADSTER \$800.

This car has had careful handling; paint, varnish and upholstery look like new; good tires and one extra with tire cover mounted on rear; small mileage; this is an exceptional trade in one of these snappy roadster models. "Money Back Guarantee."

1916 CADILLAC "8," SEVEN-PASSENGER TOURING \$1200.

Tires, paint, finish and upholstery of this car are in excellent condition; a very attractive proposition at this figure. "Money Back Guarantee."

1916 CADILLAC TOURING \$1100.

Cannot be told from a new car; owner must dispose of this high grade car this week and will sacrifice for quick sale; call at once.

\$600—1916 CHALMERS 30.

Six-cylinder touring car; in good condition and fully equipped.

\$1000 1916 COLE.

Eight-cylinder; complete equipment, including two spare rims, bumper, etc.

\$750—1916 DAVIS SIX TOURING.

Seven-passenger, in the finest possible condition; has a Continental motor and cost \$1550 new.

FOR SALE—1916 four-passenger Davis roadster; run only 5000 miles; car guaranteed perfect; price \$590.

1916 DAVIS; 5-passenger; run 2600 miles; looks and runs like new; \$750.

1917 DODGE TOURING \$650.

Only run few hundred miles by young lady who must dispose of it owing to ill health; finest possible condition throughout and has every extra; guaranteed.

1917 DODGE TOURING \$625.

DODGE BROTHERS TOURING \$575. 1916 production; four new tires and re-finished body give appearance of new car.

1916 DODGE TOURING \$525.

DODGE ROADSTER, 1916, \$625. Run less than 9000 miles; fine condition; summer and winter tops.

DODGE BROS. ROADSTER \$550.

1916 production; has low mileage; been well taken care of.

1917 FORD \$410.

Touring car; used 600 miles; with self-starter, electric lights, demountable rims, same size tires all round, shock absorber, Yale switch, tire holder, every possible extra; cost new \$525; just like new.

1917 FORD \$360.

Touring car; almost new; extra equipment; Hassler shock absorbers; speedometer; fully guaranteed.

1917 FORD TOURING \$325.

Two to choose from; demountable rims, 30x3½ tires, electric lights, extra shoes and tubes; fine mechanical condition.

1917 FORD \$365.

Roadster; like new; equipped with many extras; demountable rims; extra tire rim; speedometer; shock absorbers; new car guarantee goes with it.

1916 FORD \$310.

Touring car; equipped with many extras; 1917 style hood and radiator; Gray & Davis self-starter; electric lights all round; same size tires all round; two extra; shock absorber; tire carrier; cost new \$685; rare bargain.

1916 FRANKLIN TOURING \$1400.

Rebuilt, guaranteed, now being refinished.

1916 FORD for sale; in first class condition; price \$225.

1916 HAYNES LIGHT SIX TOURING \$850. New tires good condition.

HAYNES LIGHT SIX, 1915.

Just overhauled; runs fine; all good tires; price \$800.

1917 HUDSON SUPER SIX CABRIOLET \$1500.

This ideal three-passenger convertible roadster has the full panel glass sides, easily converted into an open coupe effect or roadster, an abundance of room; leather lined, exceedingly smart and trappy in appearance and the only car of its kind offered today; this means quite an appreciable saving; come in and look it over.

1917 HUDSON CABRIOLET \$1325.

Looks just like new; has been run 3659 miles; if you are interested in a car of this type come and ride in it.

HUDSON Super-Six 1916 touring \$900.

1916 HUDSON TOURING CAR.

Seven-passenger; paint and general appearance excellent; small tires; will give good gasoline mileage; a cheap car to operate; \$600.

HUPMOBILE, 1917; 5-passenger; 1500 miles; bought new July 14; \$1150.

1917 HUPMOBILE Touring in fine condition; \$850.

\$750—LATE 1916 HUPMOBILE TOURING CAR.

In good condition and fully equipped; looks like new.

1916 INTER-STATE; used only by lady a few months; 20 miles to gallon of gasoline; price \$550.

1915 JEFFERY TOURING \$450.

This fine, light family touring car is fully equipped and has had very little mileage; inexpensive to operate; easy riding and quiet running.

1915 KING TOURING CAR.

Five-passenger; like new; a big bargain at \$590.

1917 KISSEL KAR ROADSTER \$710.

Has been run 2600 miles and looks just like new; if you want economy be sure and see this; also a very comfortable roadster.

1915 KISSEL \$650.

A four-cylinder, seven-passenger, 40-horsepower, economical touring car; splendid appearance; all good tires; completely equipped with tools, pump, jack, etc. "Money Back Guarantee."

1917 LEXINGTON; guaranteed; \$1150.

1917 MAXWELL \$590.

Five-passenger touring car; used 50 miles; full equipment; cost new with extras \$725; new car guarantee goes with this car; fine chance to get a new car at less than cost.

1917 MAXWELL TOURING \$465.

Only run 700 miles by present owner, who must sacrifice for quick sale; fully guaranteed and cannot be told from a brand new car; call at once.

1917 MAXWELL ROADSTER \$440.

Appearance and tires like new; driven but 3000 miles; the recent announcement of a price increase, which has almost taken effect, should make this a most attractive offer.

1917 MAXWELL CABRIOLET.

Has been carefully used and is in excellent shape; a perfect doctor's car; price \$625.

1916 MAXWELL TOURING \$400.

4-cylinder, finish like new; low mileage; excellent mechanical condition; motor run just enough to limber it up; electric lights and starter.

1916 MAXWELL \$375.

Touring car with self-starter, electric lights; in the finest possible condition; tires and paint new; demountable rims; one extra; shock absorbers; call for demonstration.

1916 MAXWELL RUNABOUT \$365.

Almost new; sent in by present owner, who must dispose of it before next Thursday; a fine chance to get an excellent light runabout cheap.

1917 METZ TOURING \$385.

Cannot be told from a brand new car; paint, shoes, etc. perfect and motor quiet running and powerful; don't miss this one.

1916 METZ TOURING \$350.

Electric lights and starter; had very low mileage; used entirely by private family; very economical to run; upholstery and tires in A1 condition.

1916 METZ TOURING \$325.

Electric lights, starter, demountable rims, carefully driven; owner has bought new Dodge Brothers touring car and is willing to sell at above low price.

1916 MITCHELL 6, 7-passenger; with 4 almost new tires; \$600.

1916 MITCHELL \$285.

Five-passenger; has electric starter and lights; 4 good tires; six-cylinder; cost over \$2000.

\$825—1917 MUNROE TOURING CAR.

With wire wheels; extra wheel and tire; car has had very little mileage and is absolutely like new.

1917 NATIONAL CHUMMY ROADSTER \$1100.

Beautifully finished in dark green with natural wood wheels; equipped with seat covers, clock, etc.; practically all brand new tires and two extra with tire covers mounted on rear. Contrary to the general rule this car comfortably seats four passengers and is an extremely snappy, powerful and high grade car; full tool equipment. "Money Back Guarantee."

1917 OVERLAND \$410.

Model 75, light 5-passenger touring car; driven very carefully but 2500 miles by a lady; all new tires and in extra fine condition; full electric equipment.

1917 OVERLAND \$390.

Roadster; model 75 B; used about 1800 miles; equipped with self-starter, electric lights; very light and inexpensive to operate; fully equipped; spare tire and rim; full guarantee goes with this auto.

1916 OVERLAND, 6-cylinder; model 86; touring; \$550.

\$550—1917 OVERLAND TOURING.

This car is an exceptional bargain at this price.

\$400—1917 OVERLAND.

Small model touring car; like new; has its original paint and tires.

1916 OVERLAND, MODEL 86, \$575.

Seven-passenger touring; in A1 mechanical condition.

1916 OVERLAND \$400.

Five-passenger touring car; model 83B; block motor; has been thoroughly renewed; self-starter, electric lights; must be seen to be appreciated; spare tire and rim.

ROADSTER 1916.

\$485; Overland; model 83; best of condition; good paint and tires; owner will demonstrate.

1916 OVERLAND RUNABOUT \$375.

Several to select from; all in finest condition and all fully equipped; model 83; and all have fine shoes and good paint; call for choice.

1917 OLDSMOBILE "8."

Seven-passenger, model 45, run less than 3000 miles; cannot be told from new; very easy riding and flexible; call early and state your own price and terms.

\$375—1917 OLDS 8 ROADSTER.

Seat 2 or 4; only used 4000 miles.

1916 OLDSMOBILE 4-CYL. TOURING \$600.

Very latest; almost brand new; full guarantee and thorough demonstration allowed; don't miss it.

1916 OLDSMOBILE "4" TOURING CAR.

A car that has had the best of care by female owner; was \$850; price now \$690; \$350 cash; balance easy.

1916 OLDSMOBILE \$700.

Two new tires; best of condition; cash or terms; or take Ford in trade.

PACKARD 1917 twin 6, 7-passenger touring, disappearing seats; guaranteed like new; cost \$3850; bargain for \$2500.

1916 PAIGE "6-46," 5 or 7-passenger touring; overhauled; repainted; new tires; Continental motor; Gray & Davis starting and lighting system; \$900.

1916 PAIGE "6-46," early series; 5 or 7-passenger touring; overhauled and repainted and guaranteed; \$700.

1916 PAIGE "6-46" roadster; in perfect mechanical condition; practically new tires; will seat three people comfortably; \$700.

1916 PAIGE "6-46" sedan; overhauled and repainted; finished in light gray whipcord; will seat 7 people comfortably; cost originally \$2300; price now \$1250.

1915 PAIGE 7-PAS. TOURING CAR \$650.

This is the Fairfield model; in excellent condition throughout; paint, varnish and upholstery show the careful handling this car has had; full tool equipment. "Money Back Guarantee."

1917 PEERLESS TOURING \$1650.

Cost \$2150 and positively cannot be told from a brand new car; only run 1500 miles by present owner, who must sacrifice for quick sale; fully guaranteed and thoroughly demonstrated.

1916 PULLMAN CHUMMY \$500.

This fine, light, popular 3 or 4-passenger roadster is in finest condition throughout, light and powerful and easy riding; call for bargain.

1916 PULLMAN \$335.

Small 5-passenger; recently overhauled and painted; new starting battery; has nice tires, demountable rims, fully equipped, lots of power, runs very quiet; 25 miles on gallon of gasoline; a very desirable car; rides very easy.

1917 PEERLESS.

Five-passenger; cost \$2150; run about 2200 miles; perfect mechanical condition.

1917 REGAL Roadster; \$550.

1915 REO ROADSTER \$550.

This light three-passenger runabout is in finest possible condition; quiet running and powerful; inexpensive to operate and easy riding.

1915 REO Touring; \$450.

1916 SAXON SIX TOURING.

Like new; thoroughly overhauled; a snap at \$550.

1916 SAXON ROADSTER \$525.

In beautiful condition; tires and paint like new; just the car for a man that wants a light six.

\$800—1917 SCRIPPS-BOOTH, 8-cylinder chummy roadster; has had the very best of care.

\$775—1917 SCRIPPS-BOOTH.

Eight-cylinder chummy roadster, in the finest possible condition; tires and paint like new.

1916 SCRIPPS-BOOTH \$500.

Roadster; used 1000 miles and absolutely like new; fully equipped; self-starter, electric lights, one spare tire and tube; call for demonstration.

SCRIPPS-BOOTH runabout; 1915; worth investigating; price \$425; is in fine condition.

1917 STEARNS-KNIGHT, 8-CYLINDER, 7-PASSENGER TOURING \$1300.

This car has had such small mileage that it would be hard indeed to tell it from a new car; has no marks nor scratches and is an opportunity for the person desiring such a car to save several hundred dollars. "Money back guarantee."

1917 STEARNS 4-CYL. TOURING.

This fine, light family touring car is inexpensive to operate, easy riding and quiet running; plenty of power and looks like a brand new car. Call for bargain.

1917 STEARNS ROADSTER.

Eight-cylinder, looks and runs like a brand new car and is powerful, speedy and very quiet running; fully guaranteed and thoroughly demonstrated.

\$650—STEARNS-KNIGHT.

1915 limousine; in exceptionally fine mechanical condition and has had very small mileage.

\$750—STUDEBAKER.

1917 touring; completely equipped; has one extra tire and tube.

1917 STUDEBAKER TOURING \$650.

Six-cylinder, almost new and is a fine light 7-passenger touring car; suitable for family or renting purposes; very powerful and easy riding; call at once.

1917 STUDEBAKER, MODEL 35, \$550.

Seven-passenger; original paint; four good tires.

1916 VELIE.

Newly painted, 7-passenger car powerful, easy riding, economical to run, fine shoes; price \$675 or exchange for smaller car.

1916 VELIE 5-PAS. TOURING CAR.

Like new; be sure and see this one; you can buy it now for \$690.

\$575—1916 WILLEYS SILENT KNIGHT OVERLAND ROADSTER.

Has had very little mileage and is absolutely like new; has its original paint, slip covers on seats and is fully equipped.

1915 WINTON SIX.

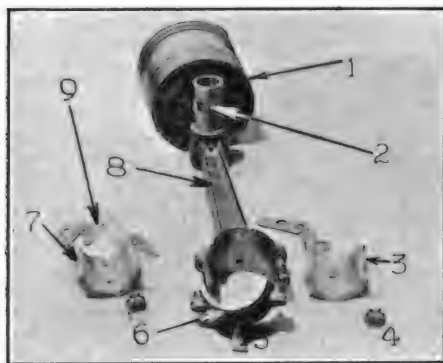
Seven-passenger, 48-horsepower; general appearance excellent; shoes very good, motor quiet, very low mileage; terms with responsible party.

RESTORATION OF THE OVERLAND, MODEL 79

Typical Car Selected for Mechanical Dissection Shows That Repair by One Man Can Be an Extremely Easy Undertaking

This is the fourth of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The fifth article of this series, which will appear in the Sept. 10th issue of the *Automobile Journal*, will be devoted to the Maxwell car.

THE design of the Overland car has been changed to a certain extent, from year to year, and so though alike in general construction models affected by the advance of modern construction will show some variation in parts. Manifestly it would be impossible to take up, in one article, the different types of Overland cars, so that this paper will deal mainly with the model 79, which is perhaps the one most typical of the average Overland used car.



Piston and Connecting Rod Parts: 1, Piston; 2, Wristpin Bushing; 3, Lower Connecting Rod Bearing; 4, Cap Nut; 5, Oil Scoop; 6, Cap; 7, Upper Connecting Rod Bearing; 8, Connecting Rod; 9, Shims.

The model 79 engine is of the L head type, the cylinders are cast separately and the heads are integral with the cylinder blocks. The crank case is made in two parts, the lower being removable, thereby giving access to the crankshaft and connecting rod bearings. This construction makes the repair by one man an extremely easy undertaking, since there are but comparatively few parts that might be considered very heavy or bulky to handle. Practically all of the work may be done by one person, the only operation liable to present a difficulty would be in putting the pistons into the cylinders, where an assistant is helpful for compressing the rings while the cylinders are being put into place.

Although the removal of the manifolds while the valves are being ground in is not essential, in case they are taken off, the danger of grinding compound working into the cylinders is eliminated. Both manifolds are held on by the same set of four manifold yokes, and after the fuel line and exhaust connections have been removed the nuts which hold the manifold yokes into place should be loosened, the yokes turned and the manifolds removed.

Preliminary to Work on Engine.

Disconnect the secondary wires and remove the inlet and exhaust valve plugs, leaving the spark plugs and priming cups in place in the plug. The valve springs may be removed with a Y iron or valve spring lifter obtainable at any repair shop.

Before beginning the work of grinding the valves the piston in the cylinder upon which the work is being done should be brought to the top of its stroke and a piece of waste or cloth carefully tucked into the valve chamber to prevent the valve grinding compound from entering the explosion chamber. If a piece of string is attached to the cloth its removal will be facilitated.

The valves may now be ground, one at a time, using a round handled screw driver as a tool, the grinding operation being the same as directed in the previous articles.

After the valves have been ground the valve ports should be cleaned thoroughly and the cloth removed, each valve being put into place and the valve spring, cup and pin returned to their places. Before finally returning the valves the valve guides should be carefully examined. If there is the slightest play between the valve stems and the guides, the guides should be forced or pulled from the cylinder block and replaced with new. This is important, since the slightest gas leakage through the guide will result in loss of power, increased fuel consumption and many other engine troubles.

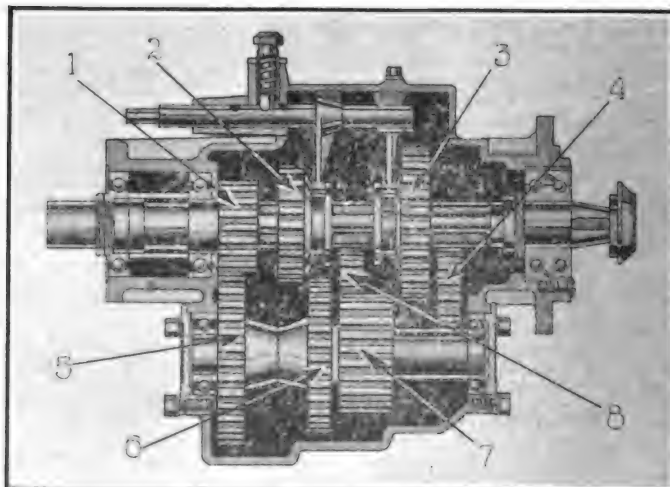
Both the water outlet and inlet are fastened to each block by two cap screws, hence, after the radiator has been drained and the hose connections removed, the screws may be taken out and the manifolds taken from the engine. The cylinder blocks, each of which is fastened to the crank case by four cap screws, are removed individually. Before removing the blocks distinction marks should be placed on them so that each may be identically returned to place.

Examining Cylinder Blocks.

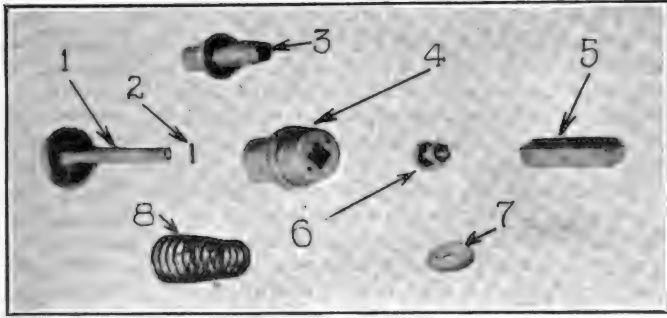
After the cylinder blocks have been removed each should be thoroughly examined. The cylinder walls should be scrutinized for scores or scratches, the various diameters measured and in case either of the cylinders are out of round or scored they should all be reground or rebored and new rings or pistons fitted.

The best practical method of cleaning the water jackets in this type of engine is by forcing a stream of water through each block, then scraping with a heavy flexible wire after the water manifolds have been removed. After the blocks have been removed the lower water opening may be stopped with a cork or wood block and the water jacket filled with a strong solution of potash lye. After the solution has stood in the jacket for about an hour it should be drained out and the jacket thoroughly flushed with pure water. The potash solution will remove the more common deposits, but is not efficient in all cases, since the encrustations may be caused by chemical salts which may be held in suspension in the water and deposited upon the application of heat. As a solvent for some forms of deposits a strong solution of washing soda is efficient.

The solution used in cleaning the water jackets may be used for the radiator. After the car has been reassembled the cooling system should be filled with the soda or potash solution and the engine run for a few minutes until the liquid is thoroughly heated. The engine is then stopped, the liquid



Phantom View of Transmission Gearset: 1, Drive Gear; 2, High and Intermediate Gear; 3, Low and Reverse Gear; 4, Reverse Idler Gears; 5, 6, 7, Countershaft Gears.



Valve and Tappet Components: 1, Valve; 2, Valve Pin; 3, Valve Stem Guide; 4, Push Rod Guide; 5, Push Rod; 6, Push Rod Cap Screw Assembly; 7, Valve Spring Cup; 8, Valve Spring.

removed and the radiator flushed with clean water. With the water running into the radiator from a hose the engine should be started and run for a few minutes. In this way the flushing water will be carried through the circulating pump and into the cylinder jackets. After this has been done the system should be filled with clean water.

Before fitting a new fan belt (if a new one is necessary) the eccentric upon which the fan bearing is mounted should be turned so that the fan is at its lowest point. As the belt stretches the fan eccentric may be turned so as to bring tension upon the belt.

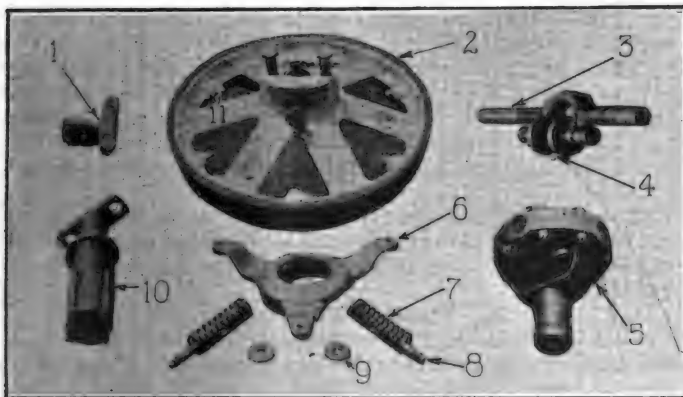
The tappets or push rods are of special design, an Overland feature. The push rod is square, one end being rounded to rest against the camshaft, the other or upper end being fitted with an adjusting screw and lock nut. By design, then, the push rod assembly may be removed for replacement very readily. The method is to unscrew the push rod guide yoke stud nut, turn the yoke one-quarter way around and lift the push rod dust cap and guide from the crank case.

When there is play between the rod and bushing excessive oil leakage results, therefore the bushing pinned into the dust cap should be replaced if the babbitt is worn. Ultimately, in replacing the push rod assembly, the rounded portion must be set across the cam or the rod dragging against the cam will cause excessive wear.

Removing Oil Base.

The lower part of the crank case, comprising the oil base, is removed by disconnecting the oil tubing to the sight feed oiler and taking out the 12 retaining bolts which fasten the base to the upper part. When the base is dropped from the engine the oil pump shaft will separate at the Oldham coupling.

As the lower part of the crank case comprises the oil reservoir, it is essential that it be given a thorough cleaning. To do this the oil pan, which is fastened in place by eight screws, should be taken out and the cleansing of the case made a thorough job by the liberal application of kerosene oil and scraping with a stiff brush. The oil gauge, too, should



Clutch Components: 1, Clutch Brake; 2, Clutch Cone; 3, Clutch Shifter Yoke; 4, Clutch Roller; 5, Universal Joint Assembly; 6, Clutch Adjusting Spider; 7, Clutch Spring; 8, Clutch Adjusting Spider Stud; 9, Clutch Spring Cup; 10, Propeller Shaft Spacer.

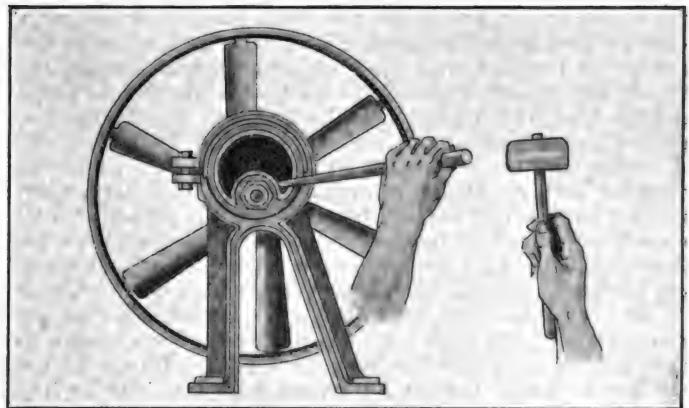
be disassembled and thoroughly cleaned.

The gear oil pump is fastened to the lower part of the crank case near the flywheel. Through a rectangular hole in the case oil is drawn into a gauze strainer and thence to the pump. This gauze should be examined carefully and if it is worn or broken replaced with new. Next the three oil pump cap screws may be removed and the top of the pump taken off, permitting the examination of the pump gears. Under ordinary conditions the life of the pump and gears is considerably longer than the life of the engine, and the only part requiring attention is the gauze.

The oil piping should be thoroughly cleaned with kerosene and a stiff wire to remove any dirt or waste that might be lodged in it. In replacing the pump cap and the pump body the surfaces should be carefully scraped and a gasket of manila paper or cork made to fit the surfaces. The gasket should be given at least two coats of orange shellac and allowed to dry. It should then be coated with shellac again and put into place while wet.

Connecting Rod Bearings.

The connecting rod bearings are removed by unfastening the caps and driving the babbitts from the holders. When new babbitts are put into place they should always be scraped or reamed to fit. An easy method of lining up the pistons is by putting the pistons into place one at a time. Then when a carpenter's square is placed against the side of a piston so that the other side rests upon the crank case parallel with the crankshaft centre line, the piston should be square with the top of the crank case. As another way a surface gauge may be used in which are the distances between the base and



Turning the Fan Belt Adjusting Cam to Tighten the Fan Belt.

the centre of the wristpin on each side of the piston should be the same.

When new babbitts are to be put into place the oil feed hole which is in the cap part of the bearing should be inspected. If this hole is stopped up or does not register with the opening in the cap, a drill should be put through the babbitt to insure an oil channel.

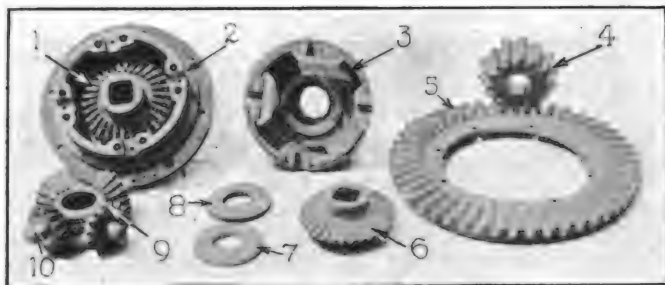
The crankshaft rotates from left to right, or clockwise. It will be noted that on each connecting rod cap is fitted a small oil dipper. The hollow part of this dipper should be on the right side of the cap, facing the front of the engine, so that the rotation of the crankshaft will cause the oil to be scraped from the pans.

The wristpin is held into the piston by a set screw, which, in turn, is kept from turning by a cotter pin. In case there is any play in the wristpin it should be removed and either it or the bronze bushing renewed. The lubrication of the wristpin is through the ends, and by splash caught in a square hole in the bushing. The holes in the wristpin should be carefully cleaned. When the pin is returned the cotter pin should be reinserted or great damage may be done the engine.

The lower parts or caps of the five main bearings may all be renewed, but to renew either of the upper parts, the crankshaft must be removed or dropped about one inch. In case the bearings are to be renewed the crank case should be removed from the chassis.

Taking Units from Chassis.

Before the crank case is removed from the chassis the starting motor and the generator should be removed. These units are held in place by a strap, which is clamped at two



Differential Components: 1, 6, Differential Gears; 2, Differential Gear Case, Large Section; 3, Small Section; 4, Pinion; 5, Drive or Master Gear; 7, Differential Thrust Bearing Ball Retainer; 8, Thrust Washer; 9, Differential Pinions; 10, Differential Spider.

points, one above the starting motor and one below the generator. The wires should be marked and the motor and generator terminals tagged in the interest of accurate reinstatement. To facilitate the work and avoid breakage the magneto should also be unbolted from the base and removed.

The radiator is supported upon two bearings at the side and reinforced by a stay rod. After the stay rod has been removed and the caps which hold the two journals to the frame, the radiator may be lifted from the chassis.

The engine is supported upon and fastened to the chassis at three points, and is fastened besides to the propeller shaft. When the two bolts which hold the propeller shaft spacer to the clutch cone, likewise the two bolts which hold the crank case to the diagonal frame members, have been loosened and the nut is removed from the stud which passes through the front cross member between the oil base or crank case lower section and the timing gear housing, the engine may be slipped forward about one inch and lifted from the chassis.

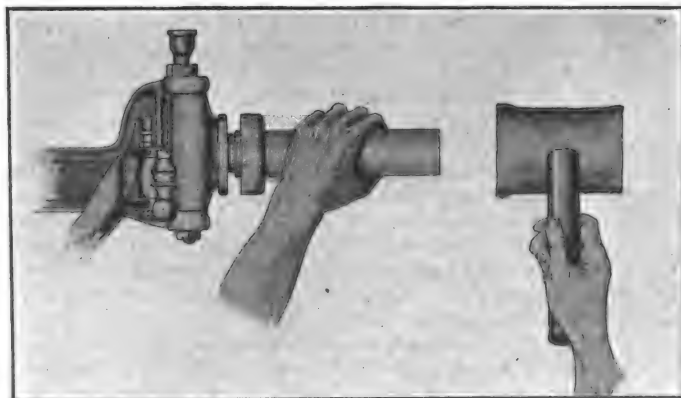
When the engine is removed in this way the clutch will be removed with it. If it is desired to remove the engine only, instead of removing the two bolts holding the propeller shaft spacer to the clutch, the nuts on the ends of the clutch adjusting studs should be removed and the springs and washers taken off. The clutch cone will then be left in the chassis.

The camshaft, with the timing gear and bearings, may be removed from the engine by unscrewing the four screws in the centre bearing and removing the cap, then taking out the set screws which hold the bearings into place and driving against the shaft with a wood block. The bearings will then be forced through the front of the crank case.

Treatment of Clutch Assembly.

After the engine has been removed from the chassis the clutch cone may be removed, if it has not already been done, exposing the clutch adjusting spider, which is mounted on the flywheel bushing, and retained by the clutch thrust bearing assembly, which in turn is held upon the shaft by the clutch locking ring. The clutch locking ring is first removed by expanding it and slipping it from the bushing. The ball bearings and spider may then be removed.

The flywheel bushing is fitted into the flywheel and clamped between the crankshaft flange and flywheel. To remove it the flywheel bolts must be taken out and the flywheel



Driving the Roller Bearings Into Place on Front Axle.

removed.

The clutch cone should be slipped back upon the crankshaft and should there be any wear, as will be evidenced by play between the cone and the crankshaft, the cone should be rebushed. If a new bushing is put into place one should take particular care to bore the grease hole in the new bushing after it is in place.

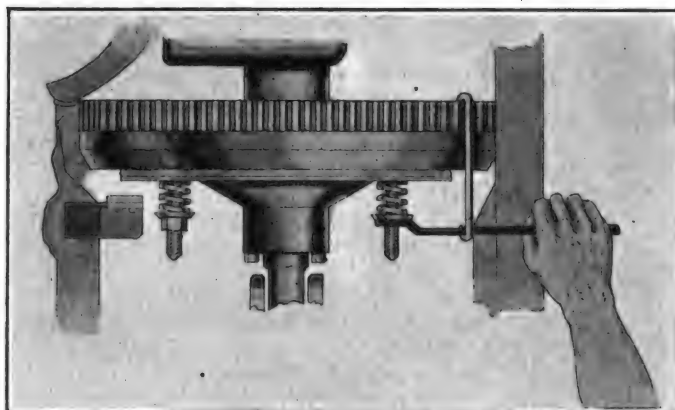
When replacing the clutch assembly it should be assembled on the shaft in the flywheel before it is put into the chassis. The clutch springs, however, may be left until the assembly is in the car and compressed by using a Y iron and a length of wire, rope or bent rod, attached to a convenient frame member, or the flywheel.

Unit Transmission System.

The transmission gearset and rear axle form the unit transmission system and to make repairs on either of these units they should be removed from the car together.

Both the foot and emergency brake rear rods should be disconnected from the rear axle and the speed rods taken off. The cotter pins should be taken from the torsion tube yoke pivot pins and the pins removed from the yoke, allowing the yoke and propeller shaft housing to hang free. Then the nuts on the spring clips which fasten the springs to the rear axle should be removed.

The chassis should then be lifted free of the axle and supported by two horses, thus allowing the axle to be drawn from beneath the car. The propeller shaft spacer may be slipped from the universal joint and the latter may be taken



Using a Y Iron and Bent Rod to Compress Clutch Springs. from the propeller shaft after the retaining pin is removed with a punch or drift.

Examining Universal Joint.

A careful examination should be given the universal joint and new parts be substituted for worn parts. The torsion tube should be unbolted from the transmission gearset and the propeller shaft drawn from the housing.

The torsion tube assembly consists of three pieces, which should be firmly riveted together. If either the yoke or the flange are loose on the torsion tube they should be riveted and welded if possible. Since the torque is through this member it is essential that it be firm.

The upper or front end of the propeller shaft rotates in two bearings. Both of these bearings should be examined and should there be any play between the shaft and the bearings the bearings should be drawn out and replaced. If this is not done there will be a continuous strain upon the propeller shaft.

The transmission gearset is fastened to the rear axle by six studs. After the nuts on the studs have been removed the gear box, with the pinion gear, may be removed and disassembled.

Shafts and Bearings.

Both the main and counter shafts are mounted on ball bearings. The main shaft is in two pieces, one of which carries the main drive gear; the other, or rear part, carries the second and high, also the low and reverse sliding gears.

The rear ball bearing retaining screw is first removed and the ball bearing driven from the inside with a bar of iron or piece of wood. With the bearing will be drawn the shaft carrying the pinion gear, leaving the two sliding gears loose in

(Continued on Page 46.)

Study of Automobile Engine Cooling System

Including Comprehensive Investigation of the Radiator, the Water Jacket, and the Circulation, With the Fan Tests Submitted to the S.A.E. Suggesting the Selection of a Standard Method of Conducting Such Tests

By A. K. Schanze*

(Chief Engineer Pitter Fan Co.)

IN TAKING up the subject of cooling internal combustion engines on automobiles, the author intended to devote particular time and attention to the fan. However, the performance of the other factors in the cooling system, namely, the radiator, the water jacket and the circulation, is so closely linked with that of the fan that a discussion of the subject would be incomplete did it not take them into consideration.

This paper will deal with water cooled engines only; air cooled systems will not be discussed.

The cooling system of the internal combustion engine as now applied on a majority of passenger cars normally divides itself into four main units: The water jacket around the engine cylinders, the circulating system, the radiator and the fan.

The order in which these have been named seems to be the order of their importance in the minds of most engineers, consciously or otherwise. It seems also that this is the historical order in which real scientific research and practical development have taken place on the cooling systems now in use.

The author is of the opinion that no order of relative importance can be assigned to these four divisions of the cooling system. They form a chain whose strength is only that of the weakest link, and wherever one of the four falls below its proper standard there lies in the system an imperfection that should be remedied.

Cooling systems give outward evidence of imperfections in two general ways; they overcool or they undercool. Of the two the latter is far the more common.

The function of the water jacket is to carry such volume of water that it will take from the cylinder walls only that heat that cannot be converted directly into mechanical energy, and the accumulation of which would be destructive to the cylinder material. From such a definition it would appear that, given the number of heat units generated, the mechanical work to be done and the heat units in excess of the latter requirement, a water jacket would be a simple matter to design.

Perhaps it is, but its simplicity is a secret in possession of a limited number of engineers. The author, during fan tests that he has conducted on cars of many different makes, has found only three or four apparently ideal water jacket designs. In the main, water jackets leave some room for improvement.

The mere solution of the problem of what volume of water a jacket must contain does not give the answer to the cool-

ing problem. The distribution of the water layers around the cylinder walls may be of even greater importance than the volume. Ignition takes place in the top of the cylinder, which is longest exposed to fire and becomes hottest. Modern engineering practise has placed the deepest layer of cooling water over the top of the cylinder, which is as it should be. However, it seems to be the foundry practise in some cases to interpose stiffening ribs or small columns on top of the cylinder, which act to retard the circulation, with the result that steam pockets seem to be formed. These are evidenced in some engines whose water jacket volumes are adequate, in the sudden increase in temperature that takes place when the engine stops.

The author has noticed in several tests that when the engine has stopped the temperature recorded by a thermometer placed in the filler cap mounted 20 degrees, from 200 to 220 degrees Fahrenheit. We lost two thermometers through having them blown from an improvised bushing in a hole in the filler cap, a jet of steam shooting 20 feet into the air from a radiator, the water in which a moment before had not been near the boiling point. Thermometers lashed in place indicated temperature of 220 degrees Fahrenheit. Repeated experiments could lead only to the conclusion that the whole mass of water was not being raised through that range of temperature in 40 or 50 seconds, but that some little patch on top of the cylinder was being converted into steam so fast that the filler neck, which was being used as a steam dome,

could not act through the overflow to relieve the pressure.

Whenever a design of water jacket permits such a condition every effort should be made to get rid of it. The condition is dangerous to the mechanical structure of the machine and also to people working around a car. The mechanical danger is present in radiators in which large areas and thin structures are not designed to carry pressures above the atmosphere. Steam above 212 degrees means such pressures. Many a radiator manufacturer has undoubtedly been called upon to replace leaky radiators that were not really defective.

The danger to human beings lies in the possibility of a clogged overflow pipe and an unsuspecting person looking into the filler neck at the psychological moment. The author saw this happen about

a year ago, when a man had his face severely scalded.

Tests conducted by authorities on internal combustion engines indicate that high compression contributes largely to the efficiency of the gas engine. High compression is always attended by the danger of preignition unless the cooling system can overcome the tendency.

If the cylinder walls are cool the gas entering on the suction stroke does not immediately expand, fill the cylinder, and

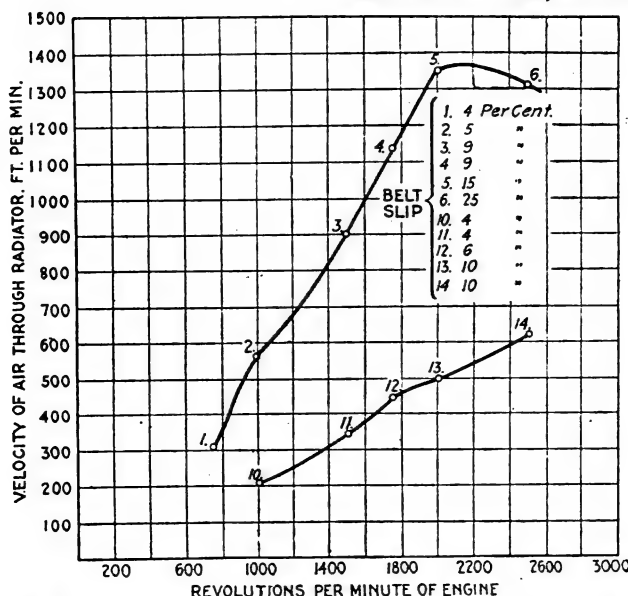


Fig. 1—Air Delivered by Fans at Different Engine Speeds. Curve A—Three-arm Multi-blade Fan; Diameter, 16 in. Curve B—Two-blade (Curved Blades); Diameter, 17 in. Fan Speed, 1½ Engine Speed, Pulleys, 3x1 in.; Belts, ¾ in. Flat.

*Non-Member.

thus prevent the full calculated quantity entering. It tends to keep its density at a value in accordance with that established by the carburetor, and then the engine gives more nearly its maximum capacity.

In order to prevent the overheating tendency immediately following the shutting down of an engine, it would seem necessary then to give the water in the jacket such volume and distribution as to enable it to absorb the last heat accumulation in the cylinders, independent of the circulating system.

Jacket design, therefore, should be such as to allow liberal distribution of water and freedom of circulation. Since the circulating systems in general use are what may be classed as pressureless systems, the water will only follow the lines of least resistance within the cylinder. Short turns will at least materially resist circulation, and may even prevent it, and thus cause "steam pockets."

The design must be followed up by close inspection of the casting as it comes from the foundry. Too much stress cannot be laid upon this. The outside of a cored casting receives careful inspection to prove its freedom from flaws, but too often the inside is passed as being hopelessly inaccessible to inspection, and is assumed to be satisfactory if the exterior shows that there are no cracks.

Types of Circulating Systems.

Between the pump system and the gravity (thermosyphon) system of circulation there is at present somewhat of a race for supremacy. The pump system frequently overcirculates, or tends to, while the gravity system undercirculates. Both faults are conducive to trouble.

In practically all pump systems the speed of the pump varies with the engine speed. This is logical enough, and conforms with good engineering theory and practise. Rotary pumps must attain a certain minimum speed before they do any effective work. This means that the starting point is considerably above zero, say about 250 or 300 revolutions per minute. Their efficiency increases after they get up to 500 revolutions per minute, usually until the speed is 800 or 900 revolutions per minute; the result is that when the engine speed is such as to result in heating the pump, which was designed to do its circulating at a car speed of 20 miles per hour, is working at high efficiency. In such cases, however, the water is thrown up into the top of the cylinder and the radiator tank faster than the internal friction of the radiator will allow it to return to the pump. The bottom of the radiator is thus one moment empty and the next full, or it may be simply allowing a small part of the water to pass into the pump and a large part to be lost through the overflow pipes. When the radiator is thus, in part, deprived of water, it cannot perform the full amount of cooling action of which it is capable. Overheating, or at least inefficient cooling, results.

It would appear, then, desirable to select a pump speed designed to circulate the water within the limits of the radiator frictional resistance and then always run the pump at that, regardless of engine speed.

In marine work, circulating pumps are used in connection with the steam condensers in exactly the same manner in which they are applied to automobiles, and it has been found that pumps have to be controlled independently of engine speed. Such practise is now universal. The automobile engineer might well investigate the experience of marine engineers along these lines.

Thermosyphon Systems.

The gravity or thermosyphon system of circulation, which is in its infancy as regards practical development, has been used with varying success. At best its impulse is feeble, owing to the lack of head. On this account it succumbs readily to any abnormal frictional resistances that may result from solid matter in the water. It recommends itself because of its simplicity of construction, low initial cost, manifest economy of operation, and the advantages derived from the fact that it continues in operation for some time after the engine stops.

Its practical application to the car so as to realize these advantages is difficult. At present too many of these systems are arranged in almost the same way as the pump system, but with the pump omitted. Best results in gravity circulation, as applied to the heating of dwellings and other

buildings are obtained with the horizontal runs comparatively short as compared with the head pipe. The principle is identical in the automobile. The head pipe must always remain well submerged. This latter feature cannot be accomplished without the use of a reserve storage tank attached to the top of the radiator.

Radiator Requirements.

After the body designer has established the shape of the radiator, and the purchasing agent has fixed its cost limit, the designing engineer can go as far as he chooses. Frontal area should be a maximum, and upon this depends net radiating area.

Radiating area can be considered from a horsepower basis, as the radiating action is exactly the process of doing work. Of the total heat of the engine absorbed by the water we have only to deal with the small residue that would cause overheating if not carried off by the radiator.

A cubic foot of air in passing through a radiator and being raised 50 degrees Fahrenheit in temperature, absorbs one B. t. u. A horsepower represents 42.4 B. t. u. per minute and upon this basis we can arrive at the other results.

The radiator whose heat transferring qualities are such as to give a uniform rise of temperature to all air passing through it, regardless of the velocity of the air, is an ideal not beyond our reach. Some are in existence that so closely approach this condition as to be considered perfect for all practical purposes.

For efficiency not only is it necessary to have the air passages free from solder obstructions, but it is just as important that they be of a size and shape that will give a good smooth run to the air. The more air that can be passed through a radiator the greater will be its cooling power.

We must also look carefully at the inside of a radiator to determine its capacity and the freedom with which water can circulate. On several occasions tests have shown that capillarity was preventing free circulation. This condition is too well known to radiator designers to need comment, but the fault does occur occasionally, and is probably due more to workmanship than design.

Core depths of as much as four inches are in common use and have their purpose. Since expense is increased with core depth it is well to regard the radiator and fan together; moreover, the power of the fan will make a large difference in the core depth. Just what conclusions to draw on this phase of the subject the author is at a loss to know. It would seem that a four-inch core was too deep for greatest efficiency, and this has at various times proved to be the case. Yet upon some tests conducted on two different makes of radiators the 3½-inch core proved to have greater capacity than the 3¼-inch core.

As a practical suggestion to car builders the author offers that every purchaser be furnished a special card cautioning him to keep the exterior of the radiator as clean as he possibly can. Much heating complaint would be avoided if radiators were kept clean. Tests go to prove that when a film of oil gathers enough road dust the radiator efficiency becomes about one-quarter normal.

Selecting the Fan.

Researches made by radiator manufacturers have shown that cooling varies directly with the quantity of air passed through the radiator, other conditions being uniform. It has, therefore, been the long time hope of many of the radiator manufacturers that an improvement be made in fans.

Experiments conducted by the writer (see Figs. 1 to 5) have confirmed the theory that cooling varies directly with the quantity of air drawn through a radiator.

Some engineers place little stress upon the value of air as a cooling agent, except within very wide latitude. They apparently are of the belief that it requires a large increase in air delivery, say 300 or 400 per cent., to make any noticeable improvement in the cooling apparatus as a whole.

In contravention to this argument it need simply be pointed out that a certain time honored practise among some engine builders proves that the contrary is the case. When engines are placed upon the dynamometers to be "run in" they are usually connected with their standard radiators, and carry their regular fans. Experience showed in some cases that this did not provide sufficient cooling to make safe running,

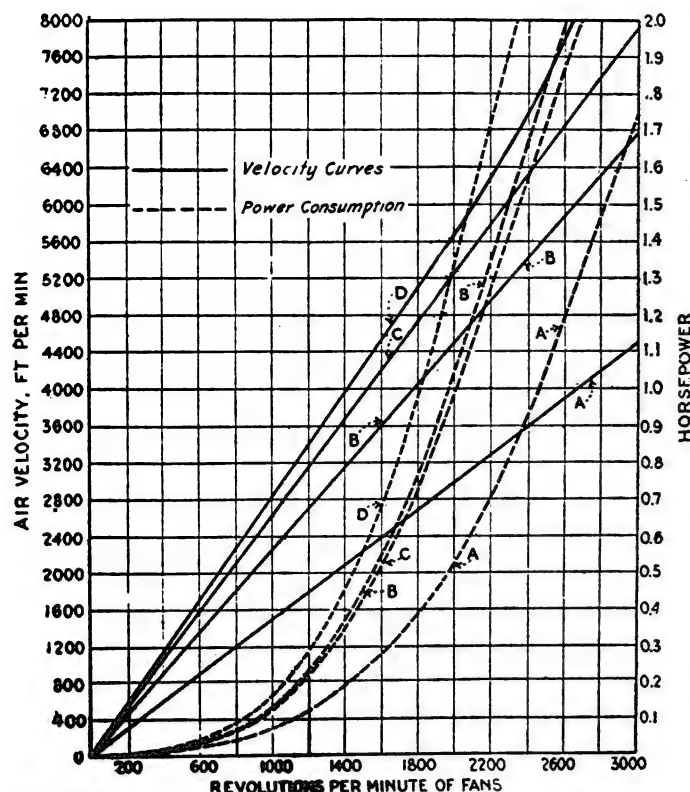


Fig. 2—Velocity and Power Curves for 18-In. Fans. Curve A—Four-blade Fan (Flat Blades). Curve B—Three-arm Multi-blade. Curve C—Five-arm Multi-blade (Special). Curve D—Five-arm Multi-blade (Standard).

so the simple expedient of placing an electric fan on a bench in front of the radiator and directing its air current into the radiator is resorted to with satisfactory results.

First and foremost in the selection of a fan should be considered the element of quantity of air delivery. The ideal radiator, as has been stated, is the one that will give off its heat at such a rate that the air that passes out of it can absorb no further heat units. In combination with this radiator the ideal fan is the one which will draw air through the radiator at such a high velocity that the air undergoes no measurable increase in temperature as it passes through.

The rate of heat transmission from one medium to another is directly proportional to the difference in the temperatures between the two mediums. This rule applies exactly between all the variations met with in automobile practise. Therefore, the efficiency of a radiator and fan system combined would be greatest when the mean temperature of the air passing through the radiator were lowest; or, in other words, when the difference in temperature of the water in the radiator and the air passing through it were greatest.

As an illustration, assume the case of a radiator on a summer day, with atmospheric temperature of 85 degrees, mean water temperature of 200 degrees and a rise in temperature of air passing through the radiator of 50 degrees. The mean air temperature through the radiator is, therefore, $85 + 50/2 = 110$ degrees, and the differential between the water and air is 90 degrees. Heat will be transmitted in its proper ratio to this differential.

Take, then, the case when all other conditions are the same as in the foregoing case, but increase the air velocity 40 per cent., and thereby reduce the temperature rise from 50 to 30 degrees. The mean air temperature through radiator then is $85 + 30/2 = 100$ degrees, and the differential becomes 100 degrees. Heat will be transmitted at a faster rate in the proportion of 100 to 90, or an increase of 11 per cent.

The foregoing demonstrates that if one fan has twice the capacity of another it does not follow that a 100 per cent. increase in the engine load capacity can be looked for.

As a matter of practise, then, the rule can be set down that the fan is of vital importance, and that the best fan obtainable should be installed. The question that follows is, what is the best fan obtainable? The answer to this is the

fan that on any limit of diameter will give the maximum air velocity per revolution is the best fan.

Air velocity depends upon a fan's ability to build up pressure, and pressure overcomes the normal friction in the radiator and drives the air through at a velocity proportional to the square root of the pressure.

Fans of any one design increase their capacities in approximately geometric progression with the increase in diameter. Best practise would therefore suggest the use of the largest diameter possible on any particular model of car.

Classification of Fans.

There are several distinct types of fans offered by the various manufacturers, classified for description as follows: Rim fans, which are those whose periphery is bound by a circular rim; flat blade fans, which are usually of three or four flat blades built out from a central spider; curved blade fans, which are similar in construction to the flat blade fans, except that the blades are curved somewhat after the manner of a garden trowel; and multi-blade fans, which are of two or more arms, up to six, and in which each arm consists of two or more blades.

Taking them in the order named we note two types of rim fans, namely, those having a thin rim almost like a wire, and those having a broad rim equal in width to the sweep clearance of the blades. In the former type, as nearly as the author can ascertain, the rim is supposed to add strength in the resistance both to centrifugal force and to bending. It is also intended to act somewhat as a safeguard to the radiator, should the fan become bent or out of line and strike the radiator. In the latter type of rim fans it appears that the intention is to reduce noise.

The author has conducted air delivery tests extensively on both types of rim fans and has found them very inefficient.

Flat blade fans are the most common in use at the present day. They are usually of the four-blade type, built upon a central spider. Their air delivering qualities are not good at low speeds, say at a peripheral speed less than 5000 feet per minute, consequently they have to be run at very high speeds. High speed fans are noisy and consume a large amount of power. These two factors will be discussed later in this paper. It is safe to say that the flat blade fans are very efficient when working at peripheral speeds in excess of 15,000 feet per minute, which for 16 and 18-inch fans is close to 3000 revolutions per minute.

Curved blade fans, as a class, are similar in their construction to flat blade fans; that is to say, they are normally

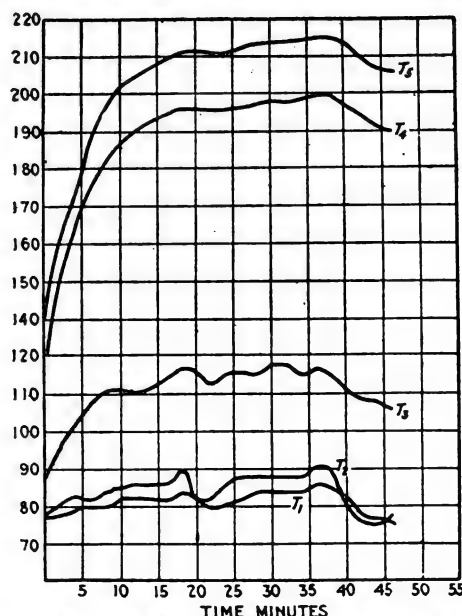


Fig. 3—Variations of Air and Water Temperatures. T_1 —Free Air in Room. T_2 —Air Entering Radiator (4 in. from Face). T_3 —Air Leaving Radiator ($\frac{1}{4}$ in. Away). T_4 —Water at Pump. T_5 —Water in Top of Radiator. Fan, Five-arm Multi-blade; Diameter, 18 in. Engine Speed, 1010 R. P. M. Fan Speed, 1610 R. P. M. (3.4 Per Cent. Belt Slip). Load on Dynamometer, 12.6 H. P. Velocity of Air Through Fan, 1300 Ft. Per Min. Radiator, Diamond Pattern. Belt, Built-up V Type.

built up on a central spider and are of three or four-blade design, generally. In capacity and efficiency they are much ahead of the flat blade and rim fans for automobile use. Of course they do not show a constantly increasing efficiency at very high speeds, 4000 and 5000 revolutions per minute, but then good engineering practise would counsel against the use of any such fan speeds where it were possible at all to get away from it. These fans are good because their efficient speeds are generally comparatively low, and they handle a considerable volume of air.

Only one multi-blade type of fan is at present in existence. This consists of groups of blades placed one behind the other, and presenting somewhat the appearance of two fans upon a single hub. Experiment has demonstrated that this is far and away the most powerful and efficient type of disk fan yet produced. The capacity is from 50 to 100 per cent. greater than that of other types, and its most efficient speed is from 800 to 1200 revolutions per minute for 16 to 20-inch diameters. It develops a high velocity pressure which draws air through the radiator even under adverse conditions. Its power consumption per cubic foot of air handled is at least 40 per cent. less than that of any other type of automobile fan it has been the author's experience to test. It also has another quality that recommends itself to the automobile engineer, namely, it develops a high suction at its periphery. This quality brings the edges and corners of a radiator into use. The advantages of this feature are self evident.

Another type of fan very little used in the automobile industry, but worthy of notice in a paper of this kind, is the centrifugal fan. This is a fan that takes air through the line of its axis and discharges it in the plane of its perimeter. It develops a high pressure, but is of comparatively low volumetric capacity. On air cooled engines it has been found satisfactory, but its adaptability to water cooled systems remains to be worked out.

The engineer in making his selection of a fan should take into serious consideration the amount of power necessary to handle maximum air velocities through radiator. This phase of the question has been considered by very few engineers. A study of the accompanying power curves will show that an astonishing amount of power can be used by a fan when its speeds are excessive.

Fan Power Consumption and Speed.

Take, for example, the 18-inch fans for which the power, speed and air delivery are plotted. At 1000 revolutions per minute the flat blade fan was delivering a velocity in free air of 1423 feet per minute on a power consumption of 0.077 horsepower.

The multi-blade (five-arm) fan, at 1000 revolutions per minute was delivering air at a velocity of 2580 feet per minute on a power consumption of 0.18 horsepower under the same conditions.

Now compare this with what took place at double the speed (2000 revolutions per minute). The flat blade fan handled air at 2826 feet per minute velocity and consumed 0.524 horsepower, and the multi-blade fan generated a velocity of 6060 feet per minute and consumed 1.4 horsepower.

The increase in power, it will be noted, was almost in direct proportion to the cube of the speeds.

Many engines are so geared that the fans at times are supposed to be making as many as 4500 revolutions per minute and the power consumption theoretically increases to six or eight horsepower. It is the author's contention that such a power expended on driving a fan is completely wrong, and that its practise should be discontinued without delay. Engines running up steep hills or through heavy roads are frequently shifted into low gear in order to let the cylinders do the work possible at high piston speed. Under such circumstances, then, the fan is demanding one-sixth to one-eighth of the engine's power. This six or eight horsepower generates its quota of heat, which again has to be extracted. It is a good fan that will assume this additional burden without allowing boiling.

Fan Belts and Pulleys.

In looking at the situation from a practical standpoint we must investigate the medium through which this high power reaches the fan. This transmission is usually through

either a flat or V belt. Can a leather or canvas belt, whose contact width is between three-quarters and 1¼ inches, transmit much over three horsepower? The best authorities on the subject say it cannot be done. This answer is probably correct.

Many pulleys in use are too small in diameter. While theoretically pulley diameter has no effect whatever on power delivery, it does have a material effect on belt slip and consequently upon fan speed. Much fan trouble arises from this cause.

The experience of belt makers shows that a pulley should never be of a diameter less than 30 times the thickness of the belt. This is practically out of the question in most automobile designs, as it would necessitate a four-inch pulley. However, the fault of going to the other extreme and using a pulley 1½ to two inches diameter should be corrected, and must be before the automobile manufacturer can feel assured of getting the designed performance from fans. A minimum diameter of three inches is earnestly recommended.

Much remains to be done in selecting belts, and from recent reports it appears that some types of V belts are giving superior service.

Experiments conducted by the author demonstrated that with a one-inch flat belt a 15-inch fan could not be driven at a speed greater than 3200 revolutions per minute without a large percentage (over 30) of slip, which soon proved destructive to the belt.

The summary of the whole situation then, is that when the engine gets beyond a certain speed, so that the fan makes 4000 revolutions per minute or over, the belt begins to slip, and once this condition has set in the fan becomes worse than useless. A slipping belt does itself much harm, and in addition polishes the fan pulley so as to make the percentage of slip at normal speeds greater.

Disadvantages of High Fan Speed.

Several hundred thousand cars are built annually in which fans are so connected as to develop a speed of from 2000 to 2500 revolutions per minute when the car speed is 20 miles per hour. These cars, most of them, do not show a tendency for the engine to heat when traveling over smooth roads at that speed, but they do when making from 30 to 40 miles per hour, or when the engine is doing the same amount of work in one of the low gears. Then at just the time when the cooling agents are most in demand the fan is either slipping, or using an amount of power not at all commensurate with its cooling power.

In fan practise, both in the ventilating and in the automobile trade, it has been pretty well proved that all fans become noisy when their tip speeds exceed 5000 feet per minute. At any speed beyond that there is bound to be noise, which increases with the speed. When 16 and 18-inch fans are running at 2000 revolutions per minute or more they are far above the silent zone speed. In many cases they produce sounds much resembling a saw mill.

When a car is racing at 35 or 45 miles per hour the driver is too busy to notice the objectionable noises, but when the same car rolls down a smooth city boulevard at 20 miles per hour, and all of the other mechanisms are practically noiseless, it is somewhat incongruous to have a little two or three-pound fan making all the fuss.

The demand from engineers who build our standard cars is daily becoming more insistent for less noise from the fan. The only way for this demand to be met is to bring the fan speeds down to somewhere within reasonable limits.

The apparent obstacle to meeting this demand successfully is the fact that, generally speaking, fans in use today will not deliver much air until they are buzzing at tip speeds of about 10,000 feet per minute. It is to be hoped that automobile engineers will make fan builders produce better fans.

Everything points to the necessity of reducing the fan speed; wear on bearings and belts, noiseless operation, and, most of all, conservation of power, demand fans that can deliver the air at lower speeds. In short, we must have better fans.

Types of Fan Bearings.

Bearings are of several distinct designs: the plain iron or steel bearing, similar to an ordinary wagon wheel on its axle; the bronze bushing on the steel spindle; the cup and cone

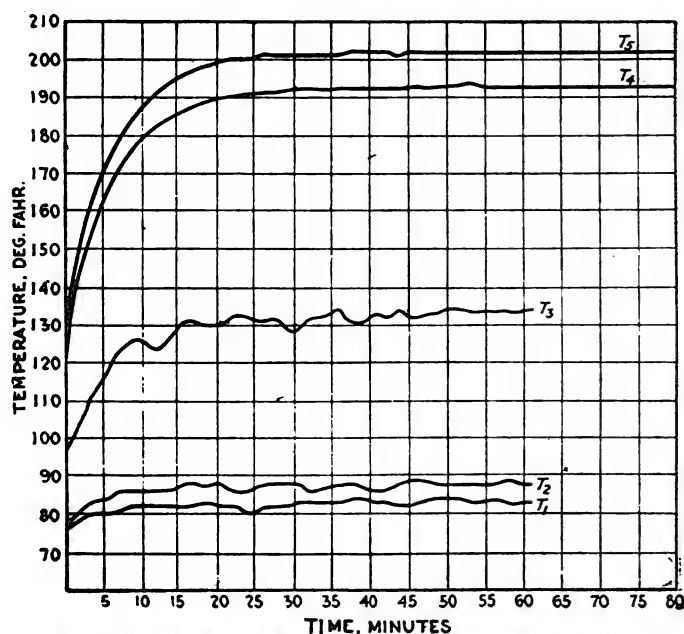


Fig. 4—Variations of Air and Water Temperatures.
 T_1 —Free Air in Room. T_2 —Air Entering Radiator (4 in. from Face). T_3 —Air Leaving Radiator ($\frac{1}{4}$ in. Away). T_4 —Water at Pump. T_5 —Water in Top of Radiator.
 Fan, Five-arm Multi-blade (std.). Diameter, 18 in. Engine Speed, 998 R. P. M. Fan Speed, 1591 R. P. M. (3.4 Per Cent. Belt Slip). Load on Dynamometer, 12.5 H. P. Velocity of Air Through Radiator, 897 Ft. Per Min. Belt, Built-up V Type. Radiator, Square Air Tube, $3\frac{1}{4}$ in. Core.

ball bearing; the roller bearing and finally the annular bearing.

The iron hub or steel spindle bearing satisfies the demand for a low priced bearing. It gives satisfaction of a certain kind, but it is subject to and does have so many troubles that it really should not be used.

The bronze bushing on the steel spindle is good enough in its way, but it costs real money when properly made, and has a tendency to let its lubricant run out at both ends and spatter things with grease. The saving in cost over one of the types of roller bearings is so little as to make it hardly worth while.

The cup and cone ball bearing has been the most widely used of the so-called "better bearings."

The author has never been able to comprehend just how this type became so popular since its basic principles are wrong for most fan applications. For shafts or spindles that present a uniform vertical thrust the balls take the load in a normal line because their obliquity to the axial line is compensated for by the opposition of one set to the other. Such is the case in motorcycle and bicycle axles. The belt on fans exerts a heavy downward pull, usually from the line half way between the cups and the fan, then exerts a thrust at right angles to the belt pull. The whole arrangement, therefore, seems wrong.

The cup and cone bearings apparently are always looking for trouble. As a matter of fact, a good cup and cone bearing ought to be the most expensive kind to make, but again the element of reduction in first cost has influenced conditions to a point where the greatest criticism that can be made is of the quality of the materials used.

The annular bearing is the ideal for those who are willing to spend the money for quality. Good annular bearings cause no trouble and good ones can be found. They are noiseless and reduce friction to a minimum. They can also take up the thrust without the interposing of thrust washers. The automobile engineer should, however, look out for cheap imitations as there is a wide difference in quality among the many makes of annular bearings. The best that can be had is none too good.

Roller bearings of several types have been offered for fan use. The application of these on fans has been comparatively limited, but there will be a decided increase in their use during the next year. One make in particular has stood the test of continuous running and meets the price qualifications with-

in reasonable limits. It consists of a series of helical steel rollers held in place by two end disk washers. The latter are rigidly held in their planes by small rods that also serve as spacers between the rollers. The whole presents the form of a hollow cylinder two inches long. This is placed over a carefully machined steel spindle. Into the pulley hub is inserted a seamless or split steel sleeve that acts as an outer path for the rollers while the steel spindle is the inner path.

It is earnestly recommended that this subject be considered by the society with a view to standardizing one or two types of bearings. The engineers could then write uniform specifications and fan makers would be free to devote more effort to the fans proper.

Application of Fans.

Taken, then, as a whole unit, the fan should be considered with all the care given any other part of the car. Other parts of the chassis and body should be constructed with a view of letting the fan do its work in the most efficient manner. Assuming now that a fan has been selected the nature of its application must be studied.

The air intake through the radiator should present as little friction as possible; there is a wide difference in this respect. The distance between the fan and the radiator should always be one-half inch.

The air "getaway" will bear much improvement, and such improvement can be made. For best results the discharge area should exceed the intake area by at least 20 per cent. This rule assumes, also, that the discharge space will be in one location and unobstructed. No automobile known to the author presents such a condition. Moreover, in every car thus far measured, the discharge areas are less than the free radiator supply area.

Spaces under the dash are hard to alter, but plenty of louvers can be inserted in the hood, and these should be figured as the primary means of air escape. Why the car designer objects to louvers is not altogether clear, but their necessity is so great that appearance can well be sacrificed.

The air passing through a radiator expands a great deal under the hood. With an inadequate escape area the static pressure builds up to a point beyond the fan capacity and relieves itself by backing out through the radiator.

To overcome this shrouds have been placed around fans in some cars. The effect is then to increase the air distribution over the front of the radiator, but the shrouds are inefficient because of the sharp angle they necessarily make with the rear face of the radiator; furthermore, they cannot increase the capacity of the fan.

The air velocity will be greater than it was through the deep radiator because the friction has been reduced. Thus

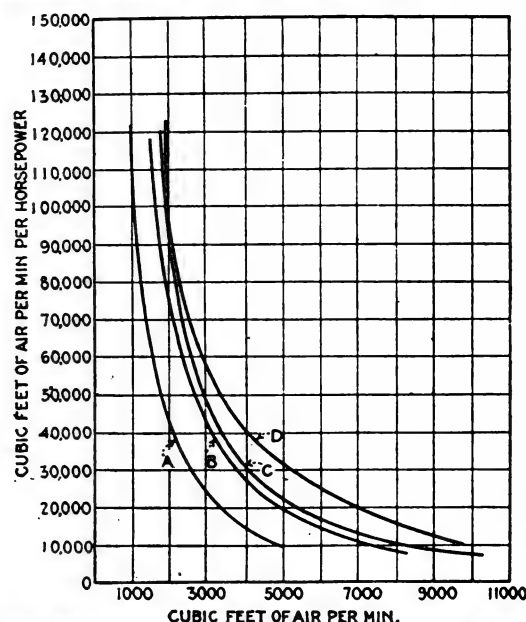


Fig. 5—Relation of Horsepower and Free Air Discharged by 18-In. Fans.
 Curve A—Four-blade Fan (Flat Blades). B—Three-arm Multi-blade. C—Five-arm Multi-blade (standard). D—Five-arm Multi-blade (Special).

the fan has even more than compensated for the reduction in core.

Methods of Conducting Fan Tests.

Up to the present time automobile engineers have been so busy with the other more complicated phases of their work that few have had the opportunity of familiarizing themselves with the rather whimsical behavior of air and fans. Consequently opinions are so diverse as to what shall be done to test a fan properly that much time is lost and the results obtained are not always satisfactory to either the engineer or the fan manufacturer.

As the S. A. E. has never adopted a standard method of conducting fan tests, the author offers the following methods for consideration:

Test No. 1—Place the fan on the shaft of a sensitive dynamometer equipped with the means of reading speed and power consumption. The fan should be at least a full diameter away from any obstructions in its rear, should have a 10 foot clear discharge space ahead, and should have at least a quarter diameter clearance between the table or bench and its peripheral circle. In front of the fan, at a distance of from three to six inches clear of the blades, a light wire frame of small squares should be placed so as to divide the area into any desired number of parts in order to obtain uniform air delivery readings.

The fan should then be run at speeds from 500 to 4500 revolutions per minute, and the air delivery and power consumption recorded for each speed.

Many engineers use the anemometer for measuring air velocity, but experience has shown that this instrument is not reliable for registering the high velocities at the face of a disk fan. It is subject to practically imperceptible, though serious damage during tests and thus may give rise to erroneous results.

The pitot tube is by far the most accurate instrument for measuring fluid motion, and is sensitive to low as well as high velocities. Furthermore, it cannot be readily damaged without being immediately observed, consequently the accuracy of its readings can be relied upon.

The results of this test will be a free air calibration of the fan and thus a standard with which tests under other conditions can be compared and checked.

Test No. 2—Connect the gas engine whose cooling device is to be tested to a high power dynamometer. Attach the fan to the engine in its standard manner and also set up a radiator, properly connected. Put in place the hood, sod pans, etc., so that the entire set up will resemble the forward part of the car.

Place laboratory thermometers in such a way that the following temperatures can be recorded:

- Air in room.
- Air entering radiator.
- Air leaving radiator.
- Water in top of radiator.
- Water entering jacket.

Keep an accurate count of the revolutions made by the fan. This is very important.

Run the engine under light load, over a range of speeds corresponding to the travel of a car at rates of from 15 miles per hour to 50 or 60 miles per hour. Six or seven such readings will usually suffice. At each speed take a set of readings in front of the radiator for air velocity through the radiator. It will be found an aid to accuracy if the radiator is divided into say 16 squares by chalk marks.

By this method a complete record of air delivery through a radiator is obtained. This test throws the entire burden of air delivery upon the fan, as no assistance is derived from forward motion of the car or from wind.

The pitot tube will be found especially valuable for this kind of test as the detailed behavior of the air can be so clearly observed.

Temperature readings can be taken during all these runs, but are not necessary, as they are provided for in the next test.

Test No. 3—With all apparatus set up as for Test No. 2, select speed, load and conditions of spark and throttle levers at which heating may be looked for. Impose these conditions and take temperature observations at intervals of about two minutes. Continue this until the water boils or until the water temperature in the top of the radiator remains uniform for 10 or 12 minutes. The fan speed should be constantly checked for slip of belt.

Test No. 4—Road tests may be run finally to check all results against those obtained in the laboratory. It will be found difficult, however, to obtain conditions fit for such tests over public highways generally, owing to the speed laws, other vehicles on the road and the general poor condition of roads over a long stretch. If a good road up a hill can be found, excellent data should be obtainable.

A positive and reliable revolution counter should be placed on the fan so that the same checks may be had as in the laboratory tests. This is even more important than indoors, because the car motion over the rough spots will be found to jolt the fan bracket loose at times. A thermometer (not a radiator heat indicator) should be secured in the filler cap of the radiator, and one should be lashed to the frame work of the car body to register atmospheric temperature. Temperatures of the other parts of the cooling system cannot be obtained in

road tests without resorting to the use of elaborate apparatus such as thermoelectric couples and recording thermometers, and even then the results are likely to be erroneous, because of car motion over rough spots.

The spark and throttle quadrants should be marked so that the levers can be reset to the positions used on a previous run, if desired.

Measured distances at known speeds should then be run and time and temperature records kept.

A full description of all apparatus used, together with the essential dimensions of the engine, the radiator, the fans, the gear ratios, etc., should accompany the report of every test.

THE DISCUSSION.

Geo. W. Smith, Jr.—Why are multi-blade fans more efficient?

A. K. Schanze—As a fan blade travels through the air it creates a slight wave ahead of it. The leading blade on the multi-blade fan handles the air in the same manner that the blade on the single blade fan does. The second blade comes along and picks up a certain amount of the bow wave that is lost by the leading blade and creates a higher compression between the two blades than would be gotten on the single blade.

Mr. Switzer—Is it not a fact that the efficiency depends on the distance between the blades?

A. K. Schanze—If the blades are too close together the efficiency is zero and the energy is wasted. They have to be sufficiently far apart to allow the following blade to pick up all the air that it would if it were free. The multi-blade fan cannot work at as high a speed as the single blade fan. A multi-blade fan takes per revolution more power to turn it. Its operating efficiency does not decrease until about 4000 revolutions per minute; beyond that it will fall somewhat in the same manner that a single blade fan will when it gets up to 6000 to 7000 revolutions per minute.

J. V. Whitbeck—Can the multi-blade fan be run at lower speeds and does it consume less power than the single-blade fan?

A. K. Schanze—The efficiency of the fan is such that the power used by the multi-blade fan is much less. We make this basic contention; that, for any given number of revolutions or for any speed, the fan will handle at least 50 per cent. more air than any other fan, or that for any volume of air it will do the work with 40 per cent. less power.

A Member—If the capacity of a single-blade fan is increased, the resistance is such that the exhaust air cannot be disposed of; the higher efficiency fan would show similar results because the resistance is so great.

A. K. Schanze—If the passage is not there for the exhaust, naturally the force applied at the front of the fan will act opposite. Handling air on a car is a difficult problem. A certain size of propeller has to be a certain diameter; otherwise a churning of the waves is produced. Propellers can be operated at an efficiency of 98 per cent. If run at from 1200 to 1400 revolutions per minute, but the air must have clear passage. The difficulty is in placing the propeller at the proper distance.

S. Jencick—It may be possible that the multi-blade fan is too efficient and compresses the air to such an extent inside the hood that the back pressure prevents sufficient air from going through the radiator. The back pressure near the front cylinder, which is the greatest obstruction to the air current, is sufficient to prevent the radiator cores furnishing air. Of course, if the air does not pass through the radiator it cannot cool the water. The single-blade type of fan will handle only an amount of air that will pass readily beside the engine and over it and under the floorboards, whereas the multi-blade fan may be so efficient that it compresses the air to a degree that destroys its own efficiency.

A. K. Schanze—The proper thing then is to reduce the speed of the multi-blade fan on the car so that it will do the same work that was done by the other fan at a greatly reduced power consumption.

MOTORCYCLES IN HAWAII.

Registration records of the island of Cahu, Hawaiian islands, on which the city of Honolulu is situated, show that 500 motorcycles are in commission there. With the exception of a few scattering machines all are of American make. Traffic regulations are similar to those of the Pacific mainland cities, with outlying districts patrolled by motorcycle policemen.

LORD NORTHCLIFFE AS A WHEELMAN.

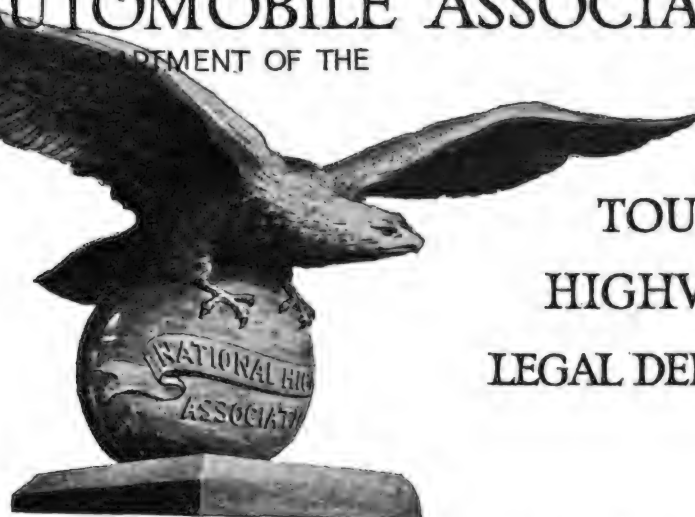
The current issue of Bicycle News calls attention to the fact that Lord Northcliffe, the famous English journalist, now in the United States, as head of the British war mission, started in the journalistic world as editor of a bicycle trade paper back in the eighties, when he was just plain Alfred Harmsworth. He was chosen for his first editorial job at the princely salary of \$12.50 per week. An old print just resurrected shows Lord Northcliffe the proud possessor of an old time, solid rubber tired, high wheeler.

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DEPARTMENT OF THE

NATIONAL
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TOURING
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9 PARK STREET, BOSTON, MASSACHUSETTS

Cost Study on Operating an Automobile

Mileage and Hourly Rates Determined in an Opportune Investigation
For Public Officials in a New England State Interest Every Motorist

IT MAY be not without interest or value to the average motorist to have some idea of the approximate cost of owning and operating an automobile. In such a study it is not possible, of course, to ascertain with absolute exactness what this outlay is, but the following summary, which was made after several weeks of investigation and consideration and submitted to public officials in one of the New England states, is, without doubt, as accurate a statement of the matter as may be presented.

The method adopted in obtaining an equitable schedule was to classify all passenger vehicles in five classes and all trucks in four classes, as follows:

PASSENGER VEHICLES.

Class "A"—All vehicles costing \$3000 or more.

Class "B"—All vehicles costing from \$2000 to \$3000.

Class "C"—All vehicles costing from \$1000 to \$2000.

Class "D"—All vehicles costing from \$600 to \$1000.

Class "E"—All vehicles costing less than \$600.

TRUCKS.

Class "F"—Trucks of $\frac{1}{4}$ ton.

Class "G"—Trucks of $\frac{1}{2}$ and one ton.

Class "H"—Trucks of $1\frac{1}{2}$ to $2\frac{1}{2}$ tons inclusive.

Class "I"—Trucks of over $2\frac{1}{2}$ tons.

The latest selling price of a passenger car and the load capacity in tons of trucks were adopted as the basis of classification. While it was realized that any average rates would of necessity produce inequalities, it seemed clear that these inequalities would be reduced to a mini-

mum by the adoption of five classes of passenger car rates and four classes of truck rates. With passenger cars the selling price seemed the only logical and practical basis for classification. In a general way the annual cost of operating a passenger car has a direct relation to its selling price. The cost items of interest, depreciation, insurance and taxes, for example, vary directly with the investment in the car and other items of operating vary more or less directly with the investment. The same facts apply to trucks, but the classification basis for trucks could be more easily found and expressed in tons of load capacity. Thus every make of passenger car between five and six hundred was listed and classified in one of five classes, and every make of truck in one of four classes.

Rates.

Having fixed these classifications, an equitable rate for each class and one that could be simply applied had to be determined. Clearly a single unit of charge must be either the mile or the hour. It was apparent, however, that neither of these units alone could equitably express all the operating costs which an owner incurred. If a car was on duty eight hours and was run only 20 miles, a total cost based solely on the hourly unit and which included an assumed average of those costs which are not incurred unless the car is run, that is, gasoline, oil, tire expense, current repairs and washing, would be excessive, since the car had been run only 20 miles, or an average of

only $2\frac{1}{2}$ miles an hour. On the other hand, if the car had been on duty only two hours and had been run 50 miles, a total cost based solely on the mileage unit would be incorrect, since an assumed average of those costs which are incurred regardless of whether the car is or is not run—that is, interest, depreciation, taxes, insurance, driver, etc., could not be figured on as high an average as 25 miles an hour. The relation between hours of use and mileage, month in and month out, is obviously much less than 25 miles an hour. A conclusion was reached, however, that both a mileage and an hourly rate would be necessary in order to arrive at equitable standards of expenditure and a study was begun for the purpose of dividing all costs of operation between these two units.

Division of Operating Costs Between Mileage and Hourly Units.

All costs of operating motor vehicles were listed. It was apparent that part of these costs were incurred only when a vehicle was run and part were incurred if the vehicle was never taken from the garage. These costs divided between the two units are as follows:

MILEAGE COSTS.

- (1) Gasoline and lubricants.
- (2) Tire expenses.
- (3) Current repairs.
- (4) Washing.

HOURLY COSTS.

- (1) Interest and depreciation.
- (2) Insurance and taxes.
- (3) License and registration.
- (4) Storage.
- (5) Cost of driver.

Mileage Costs.

To determine fair mileage costs search was made for actual performance records of enough cars and trucks of all classes to make it fair to take them for the purposes of the study. Several sources of information were examined and it was finally discovered that one large company had operated about 350 cars and trucks during 1916 and had kept very careful records of all the costs incidental to their operation. These records seemed suitable for use and were accordingly used. They were found to cover the operation of a large number of cars of each class adopted except class "D" of the passenger cars. It seemed clear, however, that it would not be equitable to combine this class either with class "C" or class "E" since there is a substantial difference in costs between classes "D" and either of the other two. Hence it was decided to assume a total mileage cost for class "D" part way between classes "C" and "E," believing that in this way substantial accuracy would be gained. The records used gave the total number of miles that all the cars and trucks of each class were run during 1916, together with the total costs of each factor of mileage expense. To determine, then, the average cost per mile of each factor, it was necessary only to divide the total cost by the total number of miles, add together the results and the total cost per mile for each class of cars and trucks was produced.

Hourly Rates.

The determination of hourly rates was somewhat more difficult because of the necessity of using assumptions in computing costs. In the first place it was necessary to assume the number of hours in a year that should be used for finding the hourly rate of expenditure with which an owner might be charged for those fixed costs which are not dependent upon any operation of cars and trucks. It seemed that the equitable number of hours to use was the number of hours that a car was actually in use during the year. Many factors of use were considered and it was finally determined that a thousand hours a year was a fair average of all passenger cars and two thousand a year of all trucks. This was checked in many ways and seems as equitable an assumption as could be made.

Having agreed upon these two assumptions it was necessary to determine what the total yearly cost was for each class of cars and trucks for the items of interest, depreciation, insurance, taxes, license, registration, storage and driver. In order to figure interest and depreciation it was first necessary to determine the average car and truck value of each class. To determine that complete lists of all makes of cars and trucks were taken and the average selling price of each class was ascertained. These were as follows:

PASSENGER CARS.	
Class "A".....	\$4000
Class "B".....	2480
Class "C".....	1440
Class "D".....	810
Class "E".....	410

Tourists in Canada

THE following statement has been issued by the superintendent of immigration of the Dominion of Canada relative to the regulations of the Canadian government toward tourist traffic:

"Bona fide tourists, being American citizens or citizens or subjects of allied or neutral countries, do not require passports to enter or permits to leave Canada, and are assured of courteous treatment and a hearty welcome. Citizens or subjects of countries with which Canada is at war may not enter even as tourists. Persons born in an enemy country claiming to be naturalized in the United States, or in some other allied or neutral country, should carry their naturalization papers. Persons of evident enemy origin, who claim to have been born in the United States, or in some other allied or neutral country, should carry a birth certificate or some other evidence of their birthplace. To facilitate departure from Canada, males between 18 and 45, entering Canada for a temporary purpose, may secure on application to the Canadian immigration officer where they enter, a card showing that they are not residents of Canada. Women and children do not require any identification card."

TRUCKS.

Class "F".....	\$855
Class "G".....	1448
Class "H".....	2290
Class "I".....	3830

Interest and depreciation on these valuations were figured at 25 per cent. This figure may be debatable, but the actual experience of the company whose figures were used showed that an average life of between four and five years was about normal. Therefore, the depreciation figure was fixed at 20 per cent. and five per cent. added for interest.

The average rate of pay for drivers was assumed to be \$1000 per annum and the hourly cost was ascertained by assuming that eight hours a day was fair. This again may be debatable, but when everything is taken into consideration, namely, that truck drivers work on regular schedule, sometimes eight and sometimes nine hours a day, that passenger car chauffeurs work irregularly and that the large majority of cars enrolled have no paid drivers, it seemed fair to figure on the basis of eight hours a day.

Taxes were determined by assuming an average rate of \$20 per thousand.

Insurance was determined from average rates ascertained from insurance companies. It is probable that the insurance costs assumed were somewhat low, but considering that owners vary widely in the classes of insurance taken, it is probable that the assumed costs which were based largely on liability insurance are fairly compensatory to owners.

The items of license and registration and storage were ascertained from the actual performance records of the company.

The actual figures obtained for mileage costs for passenger cars were as follows:

MILEAGE COSTS FOR PASSENGER CARS.

	Class "A"	Class "B"	Class "C"	Class "D"	Class "E"
Gasoline and lubricants..	\$.027	\$.029	\$.028	....	\$.019
Tire expenses..	.034	.028	.024	....	.010
Current repairs..	.042	.026	.028	....	.017
Washing .....	.010	.007	.008	....	.003
Total.....	\$.113	\$.090	\$.088	\$.070	\$.049

MILEAGE COSTS FOR TRUCKS.

	Class "F"	Class "G"	Class "H"	Class "I"
Gasoline and lubricants	\$.020	\$.042	\$.052	\$.084
Tire expenses.....	.012	.021	.012	.030
Current repairs.....	.022	.049	.071	.130
Washing .....	.003	.004	.007	.013
Total.....	\$.057	\$.116	\$.142	\$.247

The complete hourly costs as finally determined as follows:

HOURLY COSTS FOR PASSENGER CARS.

	Class "A"	Class "B"	Class "C"	Class "D"	Class "E"
Interest and depreciation	\$1.00	\$.62	\$.36	\$.20	\$.10
Insurance and taxes .....	.16	.11	.08	.06	.04
License and registration .....	.03	.02	.02	.01	.01
Storage .....	.18	.12	.09	.09	.06
Driver .....	.34	.34	.34	.34	.34
Total.....	\$1.70	\$1.21	\$.89	\$.70	\$.55

HOURLY COSTS FOR TRUCKS.

	Class "F"	Class "G"	Class "H"	Class "I"
Interest and depreciation	\$.11	\$.18	\$.29	\$.47
Insurance and taxes.....	.06	.07	.09	.12
License and registration .....	.01	.02	.02	.02
Storage .....	.06	.09	.12	.18
Driver .....	.34	.34	.34	.34
Total.....	\$.58	\$.70	\$.86	\$1.13

RAILROAD CROSSING SIGNALS.

A good suggestion comes from a Massachusetts journal to the effect that "Look Out for the Engine" signs at railroad crossings should be placed nearer to the ground so that headlights of automobiles will pick them up quickly and the poles should be some distance, perhaps 150 feet, from the crossing.

In the days when the only vehicles were horse drawn the protection of railroad grade crossings by signs and a bell on the railroad right of way was reasonably satisfactory. These safeguards, however, are ineffectual as regards automobiles.

The driver of an automobile going at a moderate speed of 20 miles an hour ought to have warning of a railroad crossing a reasonable distance away, and he does not get that now unless the sign maintained on its tracks by the railroad is supplemented by others set up by the highway commissions.



Labor Day Tours to Soldiers' Camps

Thousands Will Take Advantage of the Holiday to Visit the Boys in Khaki on Several Training Fields—The Best Routes

SOLDIER boys encamped near Boston for preliminary field training will be the magnet that will draw hundreds of automobilists over Labor Day, and for the information of motorists we have prepared the following routes to the most popular of these camps:

BOSTON TO BARRE.

67.1 Miles.

- 0.0 BOSTON. Run out over Commonwealth avenue through
- 2.5 BROOKLINE.
- 6.4 NEWTON.
- 10.0 AUBURNDALE. Cross bridge over Charles river. Four corners, curve right on Newton St. Right into Wellesley St. Left into School St.
- 13.6 WESTON. Left at water trough.
- 17.0 WAYLAND.
- 20.0 S. SUDBURY. Fork—sign post—curve right. Water trough left. Right at end of road.
- 28.0 MARLBORO. Left with tracks on W. Main St. At Williams Inn turn right on Lakeside Ave. Left at fork. Left at three corners.
- 33.5 NORTHBORO.
- 38.0 SHREWSBURY. Straight through. Left at fork. Left into Shrewsbury St.
- 43.5 WORCESTER. Run northeast on Main St. Left on Grove St. Fork, curve right. Left with trolley—sign "Holden." Right at end of street. Left at fork. Right at fork.
- 50.9 HOLDEN. Water trough. Straight ahead.
- 52.0 JEFFERSON. Fork, school, curve left. Curve left at fork.
- 56.5 RUTLAND. Fork of three roads—curve left.
- 62.5 COLBROOK SPRINGS. Fork beyond bridge, curve left. Straight through four corners, coming into Summer St.
- 67.1 BARRE.

BOSTON TO BOXFORD.

- 0.0 BOSTON. Run out over Harvard bridge to Cambridgeport. Right on Columbia St., leaving trolley. Left on Broadway. Right on Prospect St. Left on Webster Ave.
- 3.3 SOMERVILLE. Straight ahead. Right, uphill, on Walnut St. Middlesex Fells Parkway.
- 5.3 MEDFORD. Revere Beach Parkway.
- 6.5 EVERETT. Left on Broadway. Fork at car barn, pick up trolley and keep left on Broadway. Trolleys leave. Keep on main road to camp in Boxford on right hand side of
- 16.9 road.

BOSTON TO FRAMINGHAM.

20.5 Miles.

- BOSTON. Run out on Commonwealth Ave. through
- 2.5 ALLSTON.
- 9.4 AUBURNDALE. Left on Washington St.
- 11.0 NEWTON LOWER FALLS.
- 12.1 WELLESLEY HILLS. Curve left on Washington St. Right at fork.
- 13.7 WELLESLEY. Straight ahead with trolley on Central St. Go by

Wellesley College buildings.

- 16.5 NATICK. Straight ahead — sign "Framingham."
- 20.5 FRAMINGHAM.

BOSTON TO AYER.

- 0.0 BOSTON. Run out over Harvard bridge to Cambridgeport.
- 3.2 CAMBRIDGE. Curve right with Massachusetts Ave. around Harvard College buildings. Fork, keep left.
- 7.0 ARLINGTON.
- 8.8 ARLINGTON HEIGHTS.
- 12.0 LEXINGTON. Curve left away from trolley. Left at fork on Lincoln Ave. Right at fork on Lexington road. Left at fork—sign "Concord." Right at three corners.
- 19.0 CONCORD. Curve left. Fork, church, curve right. Right at fork, Elm St., sign "Acton." Right at fork, sign "Groton."
- 25.5 NORTH ACTON.
- 28.6 LITTLETON COMMON. Curve left, sign "Fitchburg." Fork, library, curve right. Cemetery, fork, keep left. Fork, curve right, sign "Ayer." Right at fork over railroad bridge into
- 35.4 AYER.

Conditions on Eastern Highways

CONTINUED storms in the Hudson Valley and the Catskill district have delayed work which for some time has been in progress around the Ashokan reservoir section and to the north.

It is still impossible for visitors to get around either side of the Reservoir of Phoenicia, but it is possible to run from Kingston to Mount Marion, north toward Glencliff, and then west, through

Unionville and Woodstock to Phoenicia.

The roads from Phoenicia to Arkville and Grand Gorge are in fairly good condition. It is also pretty smooth traveling to Oneonta and Cooperstown, but from the latter place the main line to Richfield Springs is still closed.

There is little repair work in progress in the Central Lake District of New York, but the roads are bad in many

places on account of heavy storms and it is still an undesirable touring ground.

HUDSON RIVER VALLEY—The Albany Post Road is in fairly good shape with the exception of the old detour around Irvington and repair work south of Hudson, where one side of the road is open for travel.

THE BRONX—The Eastern Boulevard is closed for sewer construction between Layton and Middletown roads.

Hunt's Point Road is under construction, but travel is pretty fair along one side of the thoroughfare.

The Fort Schuyler Road is under construction between Westchester Square and the Eastern Boulevard.

WHITE PLAINS DISTRICT—Broadway from White Plains towards Valhalla is in fair shape, as is the continuation northwest to the town of Hawthorne and the connection with the Saw Mill River Road.

Winchester avenue is in good shape to Portchester.

The Post Road through Scarsdale is closed for repairs.

The White Plains Mamaroneck Road is in good shape, but West street, which parallels it into Portchester, is rough.

Harrison avenue out of White Plains is in good shape.

The Saw Mill River Road is closed from Elmsford to Briarcliff.

BROOKLYN—Few changes have taken place in the condition of roads around Brooklyn.

Avenue J is closed for repairs between Bedford and Ocean avenues.

QUEENS—Queens Road is open between the Jamaica-Flushing road and Parson's avenue, Flushing.

ROSLYN—The North Hempstead Turnpike is under repair from the watering trough in Roslyn to Bull's Head. Use the left hand road going out of Roslyn at the trough and run down to a small pond, bear right and back into the North Hempstead Turnpike.

RIVERHEAD, L. I.—The road to Mannerville is rough and in poor shape generally.

NEW YORK STATE—Orange and Sullivan counties: The trunk line through Goshen and Middletown to Liberty is improving gradually. The old detour west of Bloomsburg is abolished, except for a short distance.

It is still bad going around Mt. Prosper into Monticello.

West of Monticello there is a long detour, but not a bad one in dry weather, around the east side of White Lake and the town of Bethel.

NEW JERSEY—Center street, Orange, is under construction.

NEW ENGLAND—Lower New England has been fairly good until very recently, but the usual midsummer ripping up mania is in vogue during August, and the traveler will meet many detours, most of which can be avoided by carefully planning one's tour and sometimes going a few miles out of the direct way.

The Summer street connection from Stamford on the Boston Post Road north to Bedford is open.

There is still a short detour at Woonsocket, R. I.

The Derby avenue route between Derby and New Haven is closed.

North of Waterbury work is in progress, but detours are not necessary.

The main line from Worcester to Boston is under repair in several places and should be avoided temporarily if possible.

NAUGATUCK VALLEY—Avoid valley at present if possible, as repair work between Naugatuck and Waterbury necessitates using detours over narrow roads.

CONNECTICUT RIVER VALLEY—Repair work is going on in several places between Hartford and Springfield.

HARTFORD-SPRINGFIELD—Due to some unforeseen reason both routes from Hartford, Conn., to Springfield, Mass., are under construction at the same time, necessitating detours either via the west or east side of the Connecticut river. The east side of the Connecticut is under construction beyond Ware House Point, while the west side route is good through Windsor Lodge to Suffield, but beyond the construction work necessitates detours that cross and recross the main road four times before Springfield is reached.

WORCESTER-BOSTON—Much of this main route through Massachusetts is under construction, and as half of the roadway is closed during these operations traffic is held up at many places along the 44 miles between Worcester and Boston.

made in the same place for violation of the traffic regulations and especially for non-compliance with the regulation making Washington street from Oxford street to Munroe street a one-way street. There is a large sign at the corner of Oxford and Washington street, which reads, "Do Not Enter Here." Motorists should observe this sign.

HINGHAM, MASS.—It will be well for motorists traveling through this town to keep in line and not attempt to shoot by motor cars ahead of them in procession. A number of arrests have been made for overspeeding and for violations of the traffic rules of this town.

MILTON, MASS.—More care should be exercised by motorists in traveling on Adams street, the main thoroughfare through Milton to Quincy, in not exceeding the speed limit and in blowing their horn at intersecting streets. Traps are being operated in various places along this road and motorists violating the traffic rules have been haled into the Quincy Court.

DEDHAM, MASS.—The eight foot law is being enforced in this town.

REVERE, MASS.—The Metropolitan police are enforcing all motor traffic regulations on the Revere Beach Boulevard and we warn motorists to run at a reasonable rate of speed and to blow their horns at all street corners. Many arrests have been made.

BOSTON, MASS.—There is a speed trap being operated on Massachusetts avenue, near the Edison Light Company. Care should be taken in not leaving cars in front of the State House for a period of more than 20 minutes, as the police are watching to arrest violators of this rule. This same rule also applies to cars left in front of the Boston City Club, Ashburton Place.

PROVIDENCE, R. I.—A number of arrests of violation of traffic rules have been made at Riverside, especially with regard to failure to have lamps properly lighted, approaching too closely a street car and overspeeding.

ALBANY, N. Y.—The police of this city are arresting motorists for violation of the traffic laws and especially with regard to not giving proper signals at intersecting streets.

NEW JERSEY—Speed traps on Pennsylvania roads are proving more and more annoying to New Jersey motorists because of their unfamiliarity with conditions in the Keystone state. Warnings have been sent out against a new series of traps west of Philadelphia on the road to Malvern, Pa. Tourists are particularly urged to avoid falling into the hands of these officials.

Motoring travelers are advised to sound their horns at every horn sign and to reduce speed to within 15 miles an hour between signs which read, "Danger, Run Slow." The 22 miles of Lincoln Highway westward from the Quaker City is reported to be sprinkled with constables who have an eye out for technical violations of the local motor vehicle regulations. The yield from these traps is larger because they have been set on the Lincoln Highway where the traffic is the heaviest.

Police Activities

A POLICE campaign against dazzling headlights is now on in Massachusetts. Prosecution is in order for flagrant violators of this law. The Massachusetts Highway Commission has determined to compel a compliance with its rules. One step has already been taken by the commission in holding up and inspecting lights on cars and arrests have followed in Brookline, Fall River and other municipalities. It will be well to remember what the law is:

"Any light thrown directly ahead or sidewise shall be so arranged that no dazzling rays from it or from any reflect-

or shall be at any time more than 3½ feet above the ground on a level road at a distance of 150 feet or more ahead of said vehicle, and said light shall be sufficient to enable the operator of the motor vehicle to see any person, vehicle or substantial object upon the roadway or side thereof, for 10 feet on each side of the motor vehicle 10 feet ahead of said vehicle."

LYNN, MASS.—Two motorcycle officers are patrolling Lynnfield street, running from Lynn to the Camp of the Eighth Regiment. A number of arrests have been made. Arrests are also being

Designers "Do Their Bit" for Motor Woman

Many Artistic and Practical
Styles Waiting in the Shops
For Her to See and Choose

The Motorist is still faithful to her beloved jersey cloth, and this suit, illustrated at the left, of beige Jersey embroidered in a dull green will be very popular for early fall motoring. The straight line silhouette is admirably adhered to in this smart model. (Courtesy Franklin Simon & Co., New York City.)

For the Motor Woman who drives about the city one of these open-meshed vells, shown at the left, is sufficient, and this new filet design is both charming and smart. A tiny dot in the filet mesh and the new style border make this design unusually becoming. (Courtesy Jennings Lace Corporation, Brooklyn, N. Y.)

Trap Shooting and Motoring have become so identified that the designers are showing smart togs to fit both sports. Dark blue jersey again proves itself adaptable. Here are pockets in profusion, the cape for the motor and a decidedly bonair hat to do its utmost to add to the occasion.



Loose Coats for Motoring are appearing among the newest models. In their beltlessness lies their novelty. The model above is well adapted for the motorist who journeys to the country club in her smart little runabout for a game of tennis.

When the Motor Woman visits the smart hotel or restaurant for luncheon and wears a costume like that shown at the left beneath her coat, she need have no apprehension, for she is up to the minute in the fashionable parade. The separate skirt and blouse are occupying a very important place in our wardrobes today and the designers are creating some very lovely things for us. The blouse is of the white Moon-Glo satin, a material that is new and beautiful and stands high in fashion's favor.

By MRS. A. SHERMAN HITCHCOCK.

THAT "there is nothing new under the sun" is a mere fallacy as far as the motor fashion world is concerned. A visit to the rooms of the leading designers and a tour of the smart shops reveals to me the fact that the requirements of the motor woman has occupied a very important place in the thoughts of our sartorial artists, and the most attractive materials and artistic and practical garments are ready for her inspection and selection. Just as in the spring a young man's fancy lightly turns to thoughts of love, so in the spring, fall, summer, winter, and a few other times of the year, a woman's fancy lightly turns to thoughts of clothes, and even though we are still interested in our midsummer wardrobe, we are still more interested in learning of the very new things. August is a difficult month for

us all—one of those between months when so many of our summer garments look wilted and passe. It is now that ingenuity must be called to our aid, for it is most necessary that the motorist is just as well groomed at this time of year as she was earlier in the season. No one will be surprised that the motor clothing of the coming season is to have a military air, for even though Milady Mobile may not be able to drive an ambulance, or do her bit in so emphatic a fashion, still there is no reason why she may not at least be in the spirit of the thing so far as her clothing is concerned. The military style of motor garments are particularly adapted for late fall touring and especially in the mountains when stop overs are to be made and climbing

and hiking are to be enjoyed, for they are above all designed for convenience, comfort and hard wear.

The motor woman is wise who makes her selection in materials and garments early, for there are always very many smart and exclusive models that are not duplicated and will not be found later. The motor woman who selects her own materials and puts herself into the hands of her modiste or tailor needs to make her selection early indeed if she wishes to be ready when such clothing is a real necessity, and what is more annoying than to be late with seasonable clothing? The majority of women are back in town this year earlier than usual, for she is apt to be taking special lessons in surgical dressing, or attending meet-

ings of her particular war charity, so she may combine doing her bit for her country and doing her bit for her wardrobe at one and the same time.

The motor frock has now come to be a *sine qua non* of the feminine wardrobe. The straight line silhouette dominates in frocks of every type. The use of various forms of draperies and tunics introduce quite a new effect in straight line styles. In the majority of cases the drapery is arranged in the lower section of the skirt, the only exception practically being in the case of draperies which are really draped tunics. A great many of the frocks are only four inches from the ground, but there are also many built from five to six inches. The modish length is really the length which best suits the style of the wearer and of the frock.

Wool is being requisitioned in such immense quantities by the government that our frocks, wraps and many of our coats are to be of silk, or a silk and wool material, during the coming months. Silks are so well liked by the majority of women for garments of this character that it will be no hardship to use more of them this season than ever and the new "slenderizing" silks are bound to soar high in popularity. They are called "slenderizing" on account of their particularly adaptable draping qualities and are *Kashmere Kloth* and *Pussy Willow* satin. These silks possess a genuine won't wear out quality and are particularly adapted for motor wear on account of their non-crushable qualities. *Kashmere Kloth* is not so lustrous as the satin and possesses something of the serge weave. They come in all the dark, rich, colorful shades, as well as the lighter ones. *Roshanara Crepe* and *Mandarin Crepe* are heavy silks with a very creepy effect and excel anything in loveliness that has been brought to my notice heretofore. *Roshanara Crepe* comes in plain and three patterns of jacquard design—the stripe, wide and narrow, large dot and check, and in most wonderful colorings. This is a silk and wool material and especially adapted for coats, capes, sweaters and millinery. The most wonderful and beautiful of all, I think, are the satin faced poplins of silk and wool mixture, which come in the plain material and the jacquard designs in the smartest of colorings. The Egyptian, Peruvian, characteristic brocade designs, prototypes of the original gold brocade patterns in Paris, and clever block designs, are in evidence. Trimmed with fur, these materials will make the most satisfactory of coats. There is a marvelous design in Egyptian effect in the new field troop color.

For the linings of our coats and capes a novel idea has been developed in the *Pussy Willow* silks by combining in the design the sign of the Zodiac and the birth stone for all the 12 months. The *Pussy Willows* are to be used for frocks, blouses and linings and are guaranteed by the manufacturers to give two seasons wear. The new designs show a leopard and lamb design, Japanese design known as *spoonland*, various block

designs, Egyptian patterns, Chinese and Japanese inspirations and many quaint and unusual patterns that must be seen to be appreciated. We are all, no doubt, familiar with *Khaki Kool*—the silk that made the silk motor suits famous. While originally brought out last spring, it is just as much in demand this fall and is used in frocks, blouses, suits, coats, capes, skirts, millinery, bags, and is, in fact, entirely proper for any part of the motor woman's outfit. I will advise my reader to glance over these fabrics before making her purchase and she may feel entirely assured that they are thoroughly reliable, entirely durable and ultra smart.

A frock and coat combination for motor use just turned out by an exclusive designer is very good. The material for both frock and coat is *Roshanara Crepe* in a new shade of green. The frock is severely plain, its only ornamentation being embroidery in the running stitch in gold silk. It has long, tight sleeves, and



Above—Glove of Washable Silk with Embroidered Back in Gray, Sand, Tan, Etc. These Gloves May Be Easily Washed in Luke Warm Water and Preserve All Their Original Beauty.

Below—Silk Glove in Gray, Tan, Pongee, Etc., with Embroidered Back and Double Tips.

the low square neck at the front and high at the back, after the fashion which is so much affected at present. The long coat is called the soldier's coat and is carried out in the exact lines of the French soldiers' coats. It has buttons of brass and also a belt buckle of the same metal. The narrow belt is of black varnished leather, and a sash end, falling from the left side of the belt, carries out the idea of the sword knot. Considerable scarlet and gold embroidery is introduced in the collar and sash.

A new and practical coat for the motor woman is of white rubberized cloth having a collar of dull blue swan skin and buttons of blue glass. It is admirable to have along when a sudden shower comes up, and is very easily cleaned.

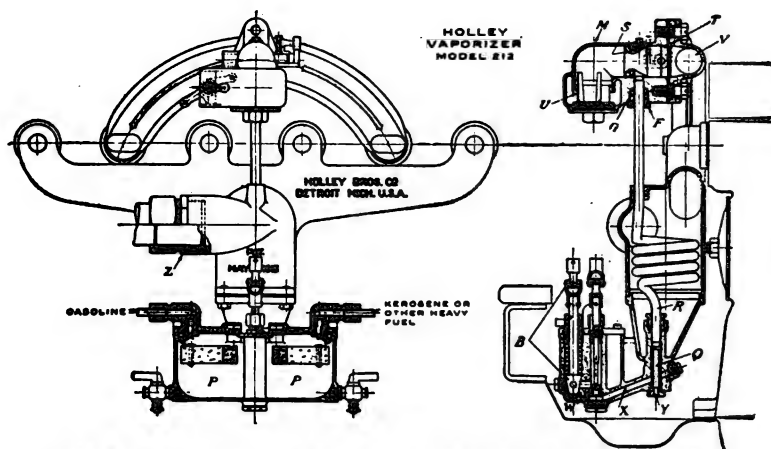
Have you seen the new *Glen Roy*

Zephyrs? They are as crisp and fresh as a cool breeze and have been hailed with delight by motor women for wear until very late under the motor coat, and even then are suitable and appropriate for home wear all through the winter. They are of the smart simplicity which pleases the discriminating woman and yet the prices make them easily within the purse of all. There are delightful plain shades, as blue, tan, pink, lavender and the loveliest stripes and checks. They will tub with the greatest satisfaction and wear wonderfully. The color combinations in the checks and plaids are admirable and in so varied an assortment that every taste will be satisfied. The stripes are likewise, a pink and white stripe, and one combining white, blue, green, red, black and yellow being particularly to my taste. Made quite simply, with collar and cuffs of white pique or organdy and with white glass buttons, one may enjoy the satisfaction of being smartly and attractively clad.

The really smart motor woman gives equal consideration to her gloves and she should make her selection in such a manner as to ensure the best wearing qualities, as well as the best appearance. The "wear right" gloves have been well named and are being taken up by motor women with enthusiasm. An illustration shows the silk wear right and another one of the washable cape. The latter comes in pearl white, gray, sand and tan, and can be had in either in contrasting silk embroidered back or solid contrasting back. They are washable and if a little care is used and they are washed in temperate water with ivory soap, they will retain their beautiful and original lustre indefinitely. The fact that they may be easily cleaned render them of particular value to the motorist. The silk "wear right" can be purchased in white or black, gray, sand, pongee and navy. They are made up two tone, silk embroidered back, and have the excellent double tip feature. They are not only cut and made in such a manner that they fit the hand remarkably well, but they are certainly possessed of unusual wearing qualities.

One of the latest additions to the summer motor wardrobe is the jacket of soft natural colored chamois. It is made perfectly plain and may be worn buttoned up to the neck or left open.

Every motor woman is always pleased to know of a new and distinctive perfume and the very latest and most exclusive thing of this kind has just been brought forth by the leading perfumer of the country. It is called "*Pour la France*" and has the most appealing and alluring odor imaginable, quite impossible to describe accurately, but thoroughly delightful and satisfying. Its exclusiveness is one of its strongest appeals to the woman of fastidious taste. The container is the most artistic thing I have seen. It will ^{be} ^{very} ^{pleasing} ^{things} ^{about} the "*Pour la France*" is that all the profits derived from its sale is to be given to the Red Cross fund.



Cross Section of Holley Vaporizer as Applied to Ford Engines.

Vaporizing Low Grade Oils

To Make Kerosene and Other Hydrocarbons Available as Fuel for the Automobile

THE Holley vaporizing system, which is a claimant for the sincere attention of motorists through its prospect of bringing nearer a day when kerosene may be used as a fuel for ordinary motor vehicles of the road, is constructed with two float chambers, one for gasoline and one for heavy fuel. The heavy fuel chamber is connected directly with the present fuel tank and the gasoline chamber is connected with a two-gallon tank which is furnished with the device.

To start the gasoline is turned on and the carburetion is rapid, making starting easy. After the manifold has heated the gasoline is turned off and the heavy fuel turned on. The heavy fuel enters the carburetor and is mixed with but a small quantity of air. This mixture of fuel and air is too rich to support combustion so that it may be carried through a highly heated passage with no danger of igniting. The rich mixture is heated to a temperature of from 300 to 350 degrees Fahrenheit before it is diluted by the main air supply. At this temperature most of the fuel is broken up so that a gaseous mixture, much like that obtained with high gasoline is made possible.

Engine operation is practically the same on kerosene as upon gasoline and there is no trouble from smoke, except in the case of ignition failure in any one cylinder. In this case the kerosene collects and when ignition is restored there will be considerable smoke until the accumulation is disposed of.

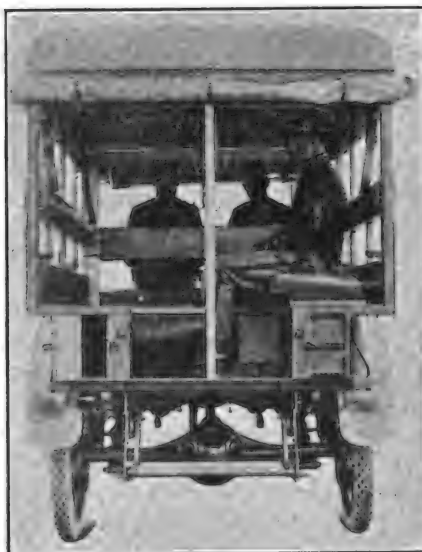
Just how the war and the tremendous drain of our gasoline resources will effect the fuel market remains to be seen. With the present price of gasoline in excess of 25 cents a gallon there is no doubt that the general tendency of the price is to rise.

If kerosene is used for general motorizing the available supply of fuel is greatly increased, and the cost of running a car for a mile will be considerably less. The Holley vaporizing system is demonstrat-

ing satisfactory use of kerosene, distillate, benzol or practically any of the hydrocarbons that have a final boiling point not over 600 degrees Fahrenheit in an internal combustion engine.

The Holley vaporizing system, made by Holley Bros., Detroit, Mich., is designed primarily for trucks and tractors, but is applicable to pleasure cars of standard engine construction. That it is a step to the practical solution of the fuel utilization problem is shown by the reports of satisfactory operation of those in use in England and France on Ford tractors and cars. In this country and England the Holley vaporizer is now being marketed for application to Ford cars and is likely to be extended to other makes.

Motor Ambulance of the Marines



United States Marine Corps Ambulance Mounted on a King Chassis in a Service Call.

JERSEY AUTO RECEIPTS NEARLY \$2,000,000.

The State of New Jersey for the past seven months received a total of \$1,697,805.55 in the form of fees from motor cars, motorcycles and licenses as compared with \$1,402,066.80 for the entire year of 1916. Motor Vehicle Commissioner William L. Dill estimates that the total receipts for the year will exceed \$1,900,000.

To July 31 there have been registered 120,540 automobiles, of which number 16,805 are of the commercial type and 11,709 motorcycle registrations.

THE NEW S. A. E. JOURNAL.

The first issue of the journal of the Society of Automotive Engineers in its new and enlarged form, succeeding the S. A. E. Bulletin, is off the press. It comes to our desk containing 175 pages and including both technical and nontechnical papers. In addition to the usual technical articles the journal prints addresses delivered at the Washington S. A. E. convention, together with articles on trucks, tractors, aviation and submarine chasers. The presidential address of George W. Dunham is also included.

MAINE REGISTRATIONS INCREASE.

The total licenses issued in the State of Maine up to June 17 for the current year were 36,074, as compared with 26,706 for the same period last year.

The State Council of Defense of the State of Wisconsin has issued an appeal to car owners to organize county squads for the purpose of taking harvesting hands to and from the fields.

The King Motor Car Co., Detroit, Mich., is placing its standard eight-cylinder King chassis under the bodies that are used by the United States Marine Corps Ambulance service. The bodies have medicine chests, two water tanks, receptacles for bandages and other necessities for the care of the sick or wounded.

This arm of the government is also using the same chassis under their light armored motor cars, hence are able to standardize in case of needing parts.

INDIAN REFINING CO. ISSUES WAR ATLAS.

The Indian Refining Co., New York, manufacturers of Havoline oils and greases, are distributing a pocket size "Atlas of the World War," which was published by the Rand McNally Co.

In addition to 18 colored maps the Atlas also contains President Wilson's address to Congress calling for war, pictures of war interest and lubricating charts of interest to every motorist.

PLATE SEVEN

SIMPLE THREE-CAR NEIGHBORHOOD GARAGE

Accommodations Provided for Automobiles in Triple Door Structure Which May Be Erected of Stucco at Moderate Cost

Designed by the Architectural Department of the Automobile Journal Publishing Co.

CONSIDERING the vast army of automobiles which one sees in the streets any day, it stands to reason that the housing of them all requires a great many garages. Of course there are numerous concerns, with large buildings, which are able to store many cars, but usually the man who owns a car will try to find some place on his lot on which to build a garage. If he is not owner of the lot, or if the condition of the lot is of a nature which did not originally take into account the possibility of the occupant acquiring an automobile, he will have to rent somewhere, and preferably somewhere near by. In our large congested cities, and even in some of our smaller towns which have often tried to be so citified that they have built on a closely cropped, square foot basis, there are many of what are called three-family houses. On such a lot, if there is room for it, there might well be a triple accommodation garage against the day when each tenant may be the possessor of an automobile.

Or, if it is too much of a stretch of the practicalities to find each of three families under one roof owning a car of their own, there is still a field for the triple garage which is the subject of Plate VII in the series of designs made by the architectural department of the Automobile Journal Publishing Co. Compulsory renters of garage space are legion.

Of the owners of three cars in one neighborhood, one alone may have the ownership of his lot and that lot be at the same time a suitable site for a garage.

The stucco garage shown in this issue is designed to handle three cars in connection with a private dwelling. It has been laid out in the open type rather than in the individual compartments, as this is a cheaper method, omitting party walls and foundations. It is ample in area to care for three cars, as may be seen by glancing at the plan. The ground dimensions are 34 feet 8 inches by 24 feet, and the structure has a ceiling height of 12 feet. There are three doors, all swinging out, as this type is the most satisfactory on small garages. They measure eight feet wide by nine feet high.

Hollow tile is the form of wall construction which is shown, 12 inches thick, this making a fine water proof wall. Directly on to the tile workmen apply the stucco, which adheres to keys or grooves on the faces of the tile. Smooth face tile may be obtained, so that the inside may be left bare and painted, but the sketch shows plas-

ter on the inside, which helps to retain heat in winter. The stucco should be at least an application $1\frac{1}{4}$ inches thick, to be of three-coat work, with a pebble, slap dash finish, thrown on the building at least four feet from the wall. Colored stucco may be used with striking effects, as to which varied suggestions may be obtained of the architectural department on application.

Concrete has been used for the foundation, which should be built as shown, having a depth of at least three feet six inches, so frost will not cause it to fail under its load. For mass concrete of this type the proportions of one part cement, three parts sand and five parts crushed stone will be found satisfactory. A concrete coping, as shown anchored to walls may be cast in position or made in moulds and placed. If the latter care should be taken in the pointing of joints with rich cement of a water proof nature.

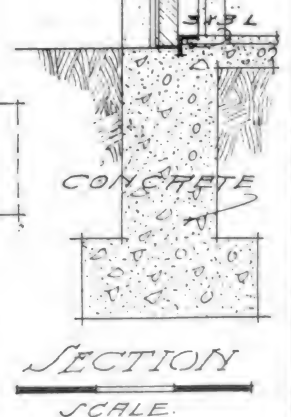
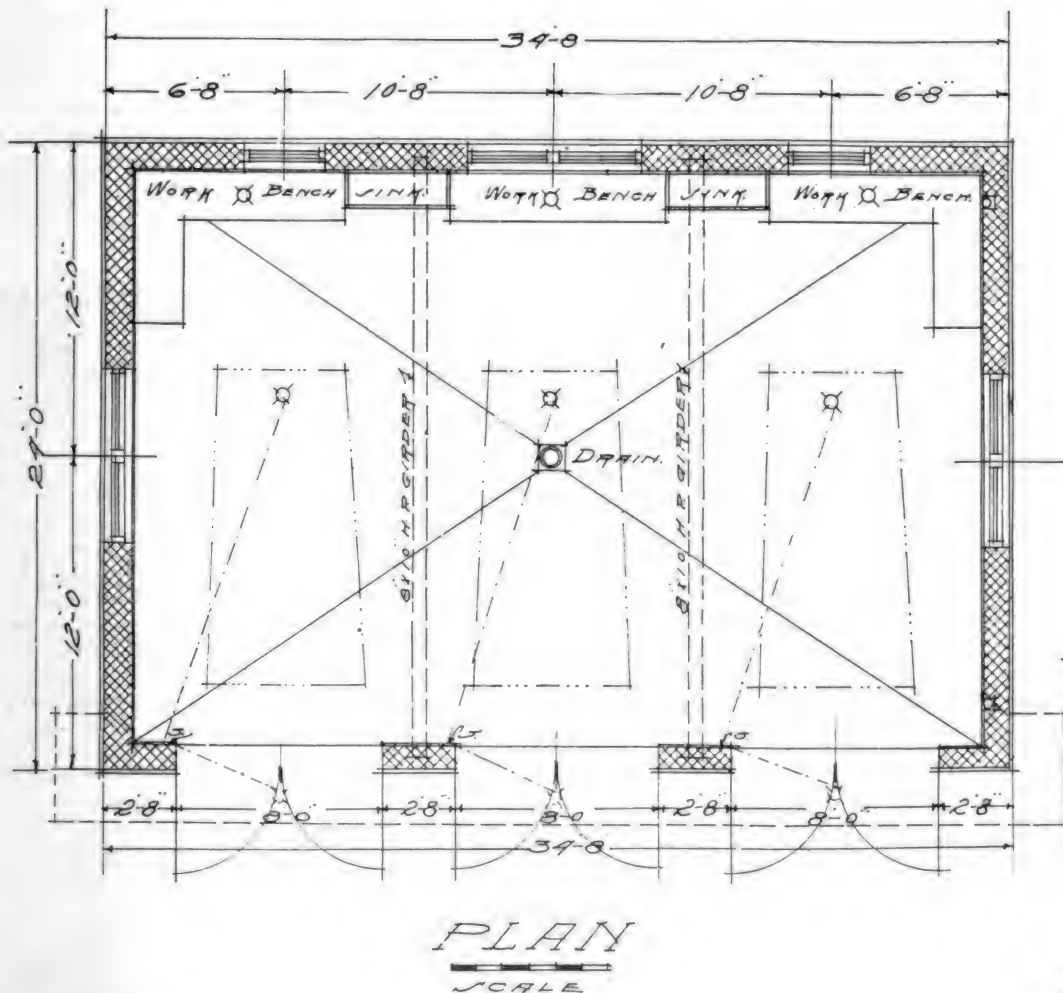
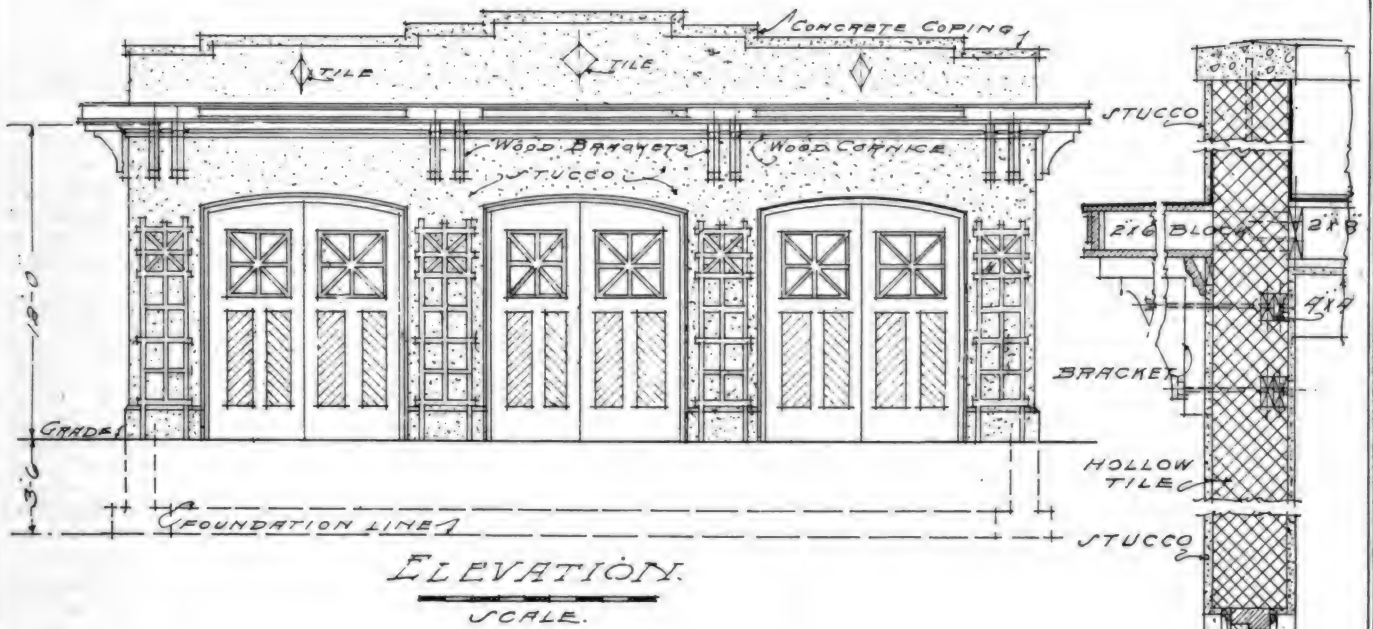
The exterior finish or trim is of wood. This includes windows, doors, cornice and lattice grills, shown between the doors. Cypress or white pine make fairly good exterior woods when properly dried and painted. Door frames can be cut from three inch by six inch stock with staff beads as shown on both sides. In the section a small angle has been shown acting in a capacity of a door stop, which is also used for keeping out the weather.

The roof is constructed of two by eight-inch rafters, for which spruce will be found very satisfactory, placed two feet on centres, over which is placed $\frac{7}{8}$ -inch roof boards and a five-ply tar and gravel roof. Two eight by 10-inch hard pine beams are shown spanning from the front wall to the rear and these carry the roof, distributing their loads to the walls. Proper care should be given all points requiring flashing and lead or toncan metal should be used.

Sinks are provided in each garage and working room has been provided amply. There is plenty of space in which to work about all three cars, as may be seen. A drain located in the centre of each stall takes care of the water for washing, also any liquids that may fall on floor.

Heating in the most economical way would be from the house, by the wall or pipe system. Other means may also be applied. Now for the question, what will the three-car garage cost? To commit this item to a specific figure would be dependant on various conditions, but that \$1000 or a little less would cover this if care is exercised in letting contract, would be a fair statement.

PLATE VII.



The Misnamed "Pleasure" Car

New Designation of "Private Car" is Suggested
for Supreme Utility Vehicle by English Writer

Alan Phillips, in the Autocar.

THE non-motor press still persists in perpetuating error of describing all but commercial motoring as "pleasure" motoring and all motors except commercial vehicles as "pleasure" cars; and, unfortunately, and surely most short-sightedly and unreasonably, many manufacturers still employ the same term and advertise "pleasure" cars when referring to any type of car other than a goods carrying vehicle.

Surely the time has come when this misnomer should be abandoned, for while a car may undoubtedly be a means of a pleasure, and, in a few cases, may even be acquired and maintained solely and exclusively for pleasure purposes, the very large majority of cars are used for business, ordinary and necessary travel, journeys to town for shopping and visiting and for the requirements of recreation and health. To include all these uses in the sweeping and indiscriminating category of "pleasure" motoring is to ignore most obvious facts.

With many people today the object of keeping a car is simply to save the constant hiring of a conveyance for visits and short journeys of an endless variety, and for such individuals to bear the stigma of mere pleasure seekers every time the car is used is unfair and unjust. To exchange horses and carriages, with all the care and attention they demand, for a car with its far easier and less expensive upkeep, is surely no sign of growing selfishness or a surrender to the cult of pleasure.

Of course there is pleasure in motoring, as there is in horse driving, but the degree of appreciation in each case is of infinite variety. Some people use a car without consciousness of pleasure in so doing, as some would prefer never to sit behind a horse; while to others the monotony of a journey, or the wearying routine of a district that must be frequently traveled, is invested with new interest from the mere fact that motoring is to them a pleasure in itself. But in such cases the pleasure is not the motive, but an "accident" in the run.

The use of the term "pleasure motoring" does not, unfortunately, fix itself on the few who deserve it, but has an unwelcome and perhaps inevitable tendency to enlarge its denotation and spread to the use of all cars that are not distinctively employed for trade.

Why not speak of pleasure locomotives and pleasure traveling by rail? For there are some to whom this is a very real pleasure, and many excursionists travel largely for pleasure purposes. Why not speak of pleasure cycling? For the cycle is largely used for pleasure. Simply because these things, which at first

opened up a new and very welcome means of enjoyment, as well as utility, have long ere now become recognized means of transit, invaluable in the work and movements of national life, while the car is only just revealing its possibilities in these directions. Doubtless the war will do much to clear the air. Pleasure motoring is practically unknown today and the world in general, and the critics in particular, are seeing in stern and unquestionable fact that the car is supremely a utility vehicle.

Why not once and for all drop the term "pleasure car" and use the far more accurate and suitable term "private car" to distinguish this from the trade van and such utility vehicles? And why not urge manufacturers to adopt this course and help to remove a prejudice which dies so hardly in the breasts of the non-motoring community.

"WOLVERINE SPEEDWAY SPECIAL" BEING BUILT.

The first model of the "Wolverine Speedway Special," which is to be manufactured by the Wolverine Motors, Inc., Kalamazoo, Mich., is being completed in a machine shop in that city. The new plant, now in course of erection, it is ex-

pected will be ready for operations by fall.

The Wolverine will have a Wisconsin motor, Warner transmission, front and rear axles, manufactured by the American Ball Bearing Co., Cleveland, O.; springs made by the Kalamazoo Spring and Axle Co.

OLDFIELD MAKES NEW WORLD'S DIRT TRACK RECORD.

Barney Oldfield, driving his new freak speed car, the "Golden Bug," established a new set of world's dirt track records from one to 50 miles at St. Louis. Many of the records that he broke had stood for years. The records are as follows:

	New Record	Old Record
1 mile	00:45:00	00:46:20
5 miles	3:53:60	4:06:58
10 miles	7:56:20	8:16:40
15 miles	12:00:08	12:23:20
20 miles	15:52:02	16:25:60
25 miles	19:57:60	20:28:80
50 miles	40:47:06	40:57:80

At the conclusion of the run, Oldfield, when told of the records he had made, made the following statement:

"It is a vindication of my theory that American made speed cars are better than the foreign made brands. My new car is in every way a home product. It was designed and built by Harry Miller and equipped with Harvard piston rings, made by the Harvard Manufacturing Co., 3939 Magnolia avenue, St. Louis, Mo. Never before have I found a piston ring equal to the Harvard. Its high compression certainly gives a vast amount of extra power. I use them on both my cars and have found them extremely satisfactory."



RACING CONTEST SCHEDULE.

Flemington, N. J., track race....Aug. 17
Uniontown, Pa., speedway race....Sept. 3
Cincinnati, O., speedway race, championship.....Sept. 3
Red Bank, N. J., track race.....Sept. 6
Pikes Peak, hill climb.....Sept. 8
Providence, R. I., speedway race, championship.....Sept. 15
Allentown, Pa., track race.....Sept. 22
Trenton, N. J., track race.....Sept. 28
New York, speedway race, championship.....Sept. 29
Danbury, Conn., track race.....Oct. 6
Uniontown, Pa., speedway race....Oct. 6
Richmond, Va., track race.....Oct. 13
Chicago, speedway race, championship.....Oct. 13
New York, speedway race.....Oct. 27

SHOW CALENDAR.

Spokane, Wash., interstate fair..Sept. 2-9
Toronto, Automobile Show, Canadian National Exposition...Aug. 25-Sept. 10
Milwaukee Show, State Park Fair,

West AllisSept. 9-15
Chicago, National Exposition of Ford Accessories, Coliseum.....Sept. 22-29
Dallas, Tex., Auto and Accessory Dealers' Association State Fair..Oct. 23-28
New York, National Automobile Show, Grand Central Palace..Jan. 5-12, 1918
Washington, D. C., Washington Automobile Trade Association Carnival and open house week..Jan. 11-18, 1918
Montreal, National Motor Show of Eastern Canada, Montreal Automobile Trade Association Jan. 19-26, 1918
Boston, Boston Automobile Dealers' Association Show, Mechanics buildingMarch 2-9, 1918

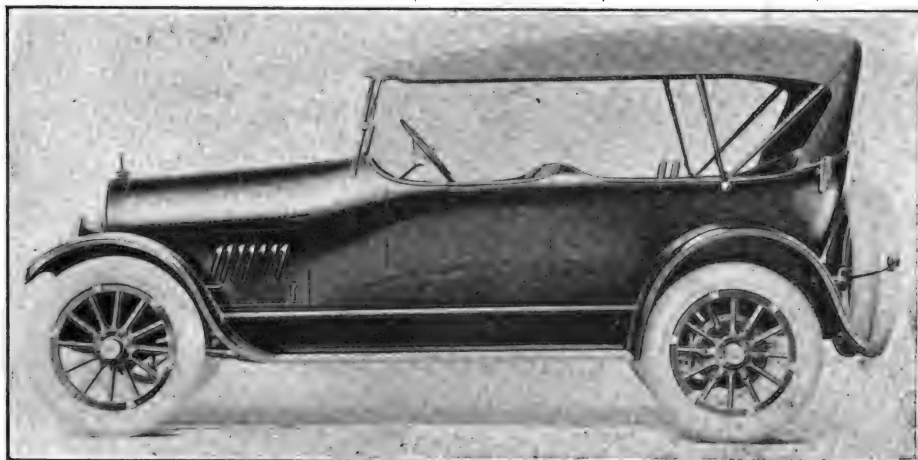
MEETINGS.

French Lick Springs, National Association of Automobile Accessory Jobbers.....Sept. 10-14
Atlantic City, N. J., Equipment Service Association.....Sept. 11-12
Atlantic City, N. J., Mid-season meeting, M. & A. M.....Sept. 12-14

Westcott Cars For 1918 Are Announced

THE new series 18 Westcott Six, made by the Westcott Motor Car Company of Springfield, O., bids fair to be one of the popular light weight cars for the coming year. It has been designed of standard units, all of which have proven their worth, and the parts are so balanced as to give the maximum power and endurance with the minimum weight. The Westcott company is still continuing its practise of building one chassis only, the design and construction of which is practically unchanged and has been in use for the past three years.

The engine is a large size Continental, six cylinders, cast in block with a bore of $3\frac{1}{4}$ and a stroke of $5\frac{1}{4}$ inches. It is of the L head type, with enclosed valves, and has an S. A. E. rating of 29.4 horsepower. Under the brake test it generates



Westcott Series 18 7-Passenger Car, Full Streamline Body with Double Cowl and Wheelbase 125 Inches.

struction the fuel mixture is fully heated, so that upon its entrance to the explosion chamber it is thoroughly vaporized.

The carburetor is supplied with fuel by a large size Stewart vacuum system, assuring full supply of gasoline under all conditions of grades.

Ignition is furnished by the Delco system from a storage battery, the distributor being fitted with automatic spark advance, as well as a manual control. By this means the position of the spark is always kept at the best point for efficient operation.

The clutch is of the multiple disc dry plate type, of unusually large dimensions, and is smooth, yet positive in action. The transmission is of the sliding gear, selective type, and has three speeds forward and one reverse. The main shaft is mounted on roller bearings and all gears are of nickel steel.

From the transmission gearset the power is transmitted to the rear axle through a tubular shaft with a torque arm, and fitted with two Spicer universal joints, amply large, and of such material as to insure against breakage or distortion. The drive is through the rear springs, the torque and braking stresses being absorbed by the torque arm.

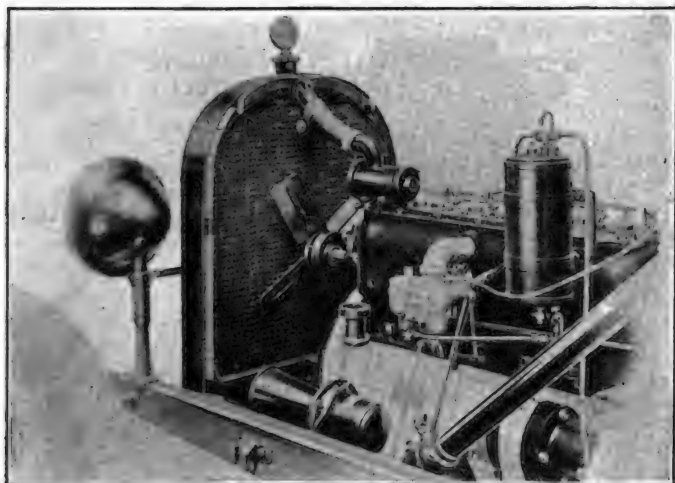
The rear axle is Timken made and fitted throughout with Timken bearings, the drive being a worm bevel gear. That there has been a liberal allowance for every essential part is shown by the spring material. Chrome vanadium steel is used for every leaf for every spring. The springs are fitted with bronze bushings and oil cups.

The front axle is also Timken and fully fitted with Timken bearings. It is of I beam section and drop forged, of the best material for that particular part.

The series 18 line embraces three open

body types, a four-passenger roadster and a seven and five-passenger touring car, the list prices of which are \$1790. There is also a Victoria top model of the seven and five-passenger touring cars at a price of \$1940. The closed models include a seven and five-passenger sedan, listed at \$2390.

The special features of the new open cars will include a new Westcott "self-acting" top.



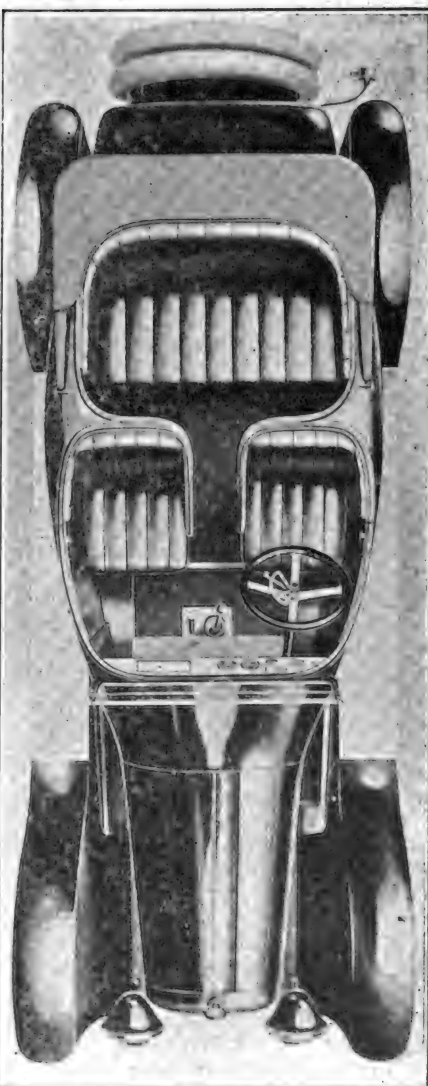
Left Side of Power Plant of Westcott Offering for 1918 Mounted on Chassis.

52 horsepower at 1800 revolutions per minute, which is about normal.

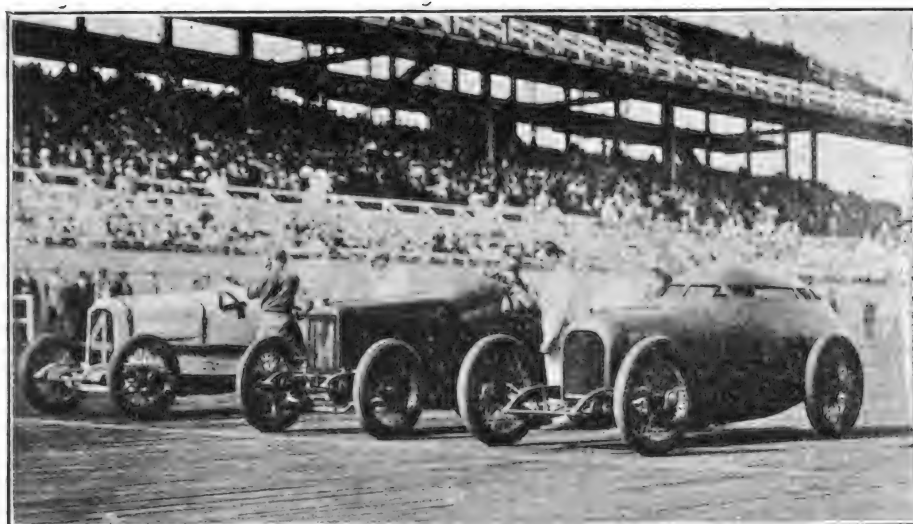
One of the refinements which makes for lightness is the aluminum crank case, the lower part of which serves as an oil reservoir. In addition to the splash system of oiling there is a constant force feed, assuring perfect lubrication under all conditions.

A centrifugal pump with thermostatic regulation forces water through a Fedders type of radiator, which is cooled by a four-blade fan. The thermostatic control regulates the supply of water passing through the radiator, so as to keep the engine temperature at the point of its highest efficiency regardless of atmospheric conditions.

One of the features that is accepted generally to be good practise is shown in the mounting of the carburetor. This unit is an improved Rayfield and is bolted direct to the cylinder. With this con-



Seating Plan Westcott Series 18 4-Passenger Roadster.



Ralph De Palma and His Winning Packard No. 4, Louis Chevrolet With Frontenac; Centre, and Barney Oldfield With His Famous "Golden Egg" in Foreground.

De Palma Beats Oldfield And Chevrolet

Ralph De Palma, driving a Packard, easily defeated Barney Oldfield and Louis Chevrolet at the Sheepshead Bay track on Aug. 18 in three match races. Oldfield used his new speed creation in the first two events, but found himself so far outclassed that he entered the 50-mile event with his Delage. Chevrolet drove his Frontenac racer in all events.

De Palma maintained whatever position he desired throughout all three races, at times staying back of Chevrolet a short distance, but coming to the front at the critical moment. Chevrolet finished second in the 20-mile and 30-mile events, and would also have held that position at the finish of the last event except for tire trouble, which permitted Oldfield to cross the tape second.

De Palma's time for the three events was as follows: 20 miles, 10:53.8; 30 miles, 16:35.6; 50 miles, 27:32.2. In the first his speed averaged 110.1 miles per hour; 108.5 in the second and 108.9 in the last event.

FORD MAKING CYLINDERS FOR AIRPLANE ENGINES.

The Ford Motor Company of Detroit is manufacturing steel cylinders for the new airplane engine which the government has developed. Deliveries are being made at the rate of 1000 cylinders a day and a total of 200,000 will be manufactured.

MAXWELL WILL HAVE LONGER WHEELBASE.

The new Maxwell models, which have just been announced, will have a 109-inch wheelbase instead of 103 inches, the length of the present models. This extension of the frame will permit the use of larger and more commodious bodies.



A Well Modeled and Roomy Five-Passenger Car, Sayers Six.

War Affects Motor Car Exports

Fewer Trucks and More Passenger Cars In Total Falling Below Previous Year.

The export of motor cars from the United States for the fiscal year ending June 30, 1917, were \$90,958,243, as compared with \$97,465,811 during 1916. The exports totaled 80,811 cars, as compared with 77,499 cars in 1916. Including parts

of automobiles, but not tires or engines, the total exports for the year amounted to \$118,243,175, as compared with \$120,002,296 last year. The following table gives more detailed figures of year's commerce in motor vehicles and equipment:

EXPORTS.

	1916		1917	
	Quantities	Values	Quantities	Values
Commercial cars	21,265	\$56,805,548	15,977	\$42,337,315
Passenger cars	56,234	40,660,263	64,834	48,620,928
Parts (not including engines and tires) ..	....	22,536,485	....	27,284,932
Totals		\$120,002,296		\$118,243,175
Automobile tires		\$17,936,227		\$12,330,201
Automobile engines	20,672	2,631,414	23,435	2,844,406

IMPORTS.

	1916		1917	
	Quantities	Values	Quantities	Values
Automobiles	1,474	\$801,911	105	\$188,280
Parts except tires .....	....	371,642	....	239,969

NEW JONES CAR HAS ADDED REFINEMENTS.

The 1918 series 26 A-B Jones Six, made by the Jones Motor Car Company, Wichita, Kan., in mechanical construction is essentially the same as the 1917 series, except for numerous improvements and refinements. Only one chassis type is made and the Jones body styles for 1918 have undergone no changes, the four styles being continued. The seven-passenger touring car sells for \$1675, the touring sedan \$2550, the Victoria model at \$1775 and five-passenger practical roadster at \$1675. The Lewis motor is used in all of the 1918 series.

"HYATT ROLLER" REACHES SEATTLE, GOING STRONG.

The "Hyatt Roller," the test car sent out on a 15,000-mile Marathon by the Hyatt Roller Bearing Company, has reached Seattle, Wash., with several thousand additional miles added to its world's record of 261,800 miles, which it held when

leaving Detroit on June 4.

The car is still traveling on its original Hyatt bearings, which were installed nine years ago when it was built, and Albert A. Dryden, the driver, in speaking of the performance, says: "I have driven the 'Hyatt Roller' over 80,000 miles, during which time the bearings have neither required adjustment or replacement. In fact, during the entire period of their service they have never received any attention except occasional oiling."

The car after leaving Detroit on its swing around the country, traveled eastward to New York City, westward to Los Angeles, thence northward along the Pacific coast to Seattle.

Sayers Co. Puts Light Six On the Market

THE Sayers Six, which has been placed on the market by the Sayers & Scovill Company, pioneer body builders of Cincinnati, O., is a new and luxurious car in the light six class. For 10 years the makers have been producing motor chassis for ambulance and other specialized vehicles, which were sold in a limited market, and in offering their passenger car model are backed by long experience and a familiarity with the materials markets which has enabled them to produce a high class chassis and body that is of the best workmanship and finish.

W. A. Sayers, for whom the car was named, is president and general manager of the company, and F. F. Scovill is vice president. Mr. John A. Campbell designed the car. Emil E. Hess is sales manager and Henry Christiaens is chief engineer. Production is in charge of Ferdinand Suesz.

The Sayers power plant is of the unit type with a Continental, high speed, six-cylinder, L head type, with removable heads, $3\frac{1}{4} \times 4\frac{1}{2}$; Borg & Beck three-plate dry disc clutch and a selective sliding gear transmission with three speeds forward and reverse. A modern horizontal type of carburetor is mounted directly on the cylinder block, and is fed by a Stewart vacuum fuel feed system.

Cooling is accomplished with a high racing type Fedders radiator in combination with centrifugal pump and air fan.



Racy Appearance and Rakish Tilt of Windshield and Steering Post Accentuates Streamline Effect of Sayers Six.

The two-unit Delco starting, lighting and ignition system is standard equipment with a Willard 6-80 storage battery. The battery is located under the front seat, where it is readily accessible.

The drive is through the springs by

the front 38 inches long and two inches wide and the rear $54\frac{1}{2}$ inches long by two inches wide. The wheels are of the artillery type with demountable rims and carry 32x4 tires, non-skid rear.

A five-passenger touring car body is mounted on the chassis, of full streamline effect with centre cowl. The body is well braced throughout and very roomy. The upholstery is finished with genuine high grade fancy trimming leather, put on in long French plaits. The body is finished in a rich shade of ultramarine blue and the chassis in black.

In addition to the complete mechanical equipment as described the car is also supplied with power tire pump, motometer, 60-mile speedometer, sloping rain vision windshield, one-man top with non-rattling bow holders, hood for top, demountable rims and extra, headlight dimmers, instrument

light, combination tail light and license holder, trouble lamp, electric warning signal and standard repair outfit.

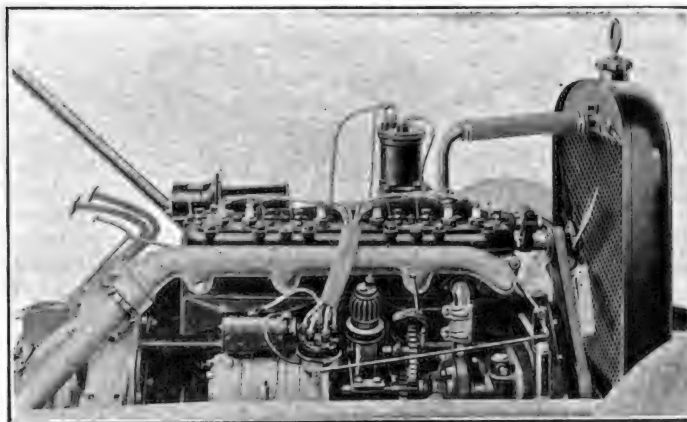
The Sayers light six weighs about 2600 pounds and will sell for \$1250.

SENATE COMMITTEE CHANGES MOTOR TAX.

The war tax revenue measure, which is in process of formulation by a Senate committee, has been practically finished and slight changes have been made in the motor car schedules as compared with the original proposals. No tax is to be imposed upon vehicles used for business purposes.

The bill goes to the House containing the following tax schedule: Motorcycles, \$2.50; cars costing less than \$500, \$5 annually; cars costing between \$500 and \$750, \$7.50; cars costing between \$750 and \$1000, \$10, with \$5 additional for each \$500 up to \$3000; and \$10 additional for each \$500 above \$3000. Cars will be appraised on a basis of 10 per cent. reduction in value allowed for each year's use down to 50 per cent.

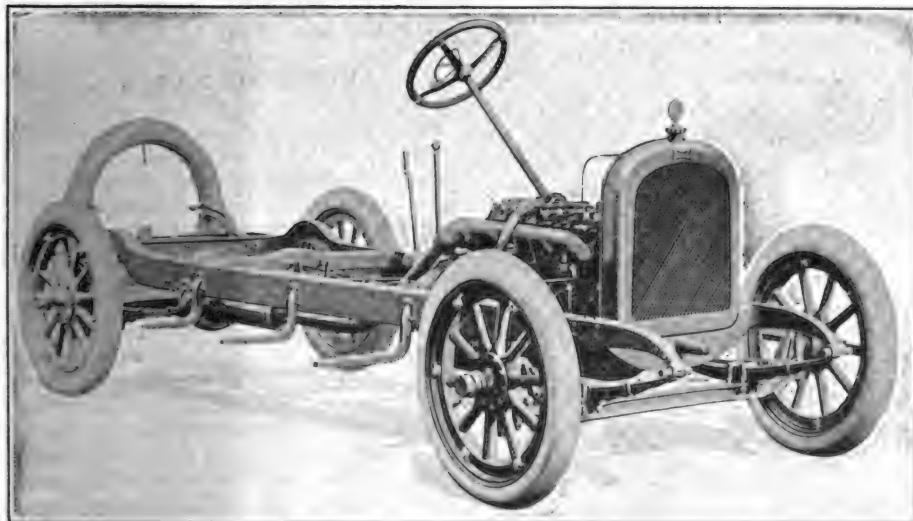
The Herschell Spillman Co. is building a large concrete factory building at its plant in North Tonawanda, N. Y.



Right Side of Motor Showing Neat Assembly of Electrical Equipment and Stewart Vacuum System Tank.

the Hotchkiss system, being transmitted by a propeller shaft with two universal joints and spiral bevel differentials in a pressed steel bridge type axle housing. The rear axle is of the floating type and the front axle is a drop forged "T" beam.

Springs are of the semi-elliptic type,



Sayers "Light Six" Chassis Showing Strong but Light Construction and Low Hung Frame.



FORD CAR STORAGE BATTERY.

A special storage battery for Ford cars is just being placed in the market. This type of battery may be used for lighting, starting or ignition, as usual, but because of its low construction it may be placed under the seat instead of in the steel box on the running board.

The makers claim a number of advantages for this installation. They say that with the battery beneath the seat a more even disposal of weight is possible, the unsightly running board box is removed and the unbalancing and great wear on the car is eliminated.

These batteries are built in the 70-90 or 110 ampere-hour capacity.

Manufactured by Michigan Storage Battery Co., 67-69 Atwater St., E., Detroit, Mich. Write for prices.

FIVE MINUTE VULCANIZER.

Tire trouble is today the motorists' greatest trial. Mechanical troubles often can be foreseen and are dependent upon materials and car usage, while tire troubles are dependent upon conditions which do not follow given laws. The traveling motorist can only guard against these difficulties by preparing himself with suitable repair outfits. For repairing punctures or small holes in tires the Adamson five-minute vulcanizer, model E, should form a desirable device. This article is designed so that it may be clamped on to the tube, over which has been placed a specially prepared patch. Gasoline is placed in the vulcanizing cup and ignited. The time required for a completed patch is approximately five minutes, and it is said that the resulting repair is extremely efficient. With the vulcanizer is one dozen patches.

Manufactured by Adamson Mfg. Co., East Palestine, O. Price \$1. Extra patches, 25 cents a dozen.

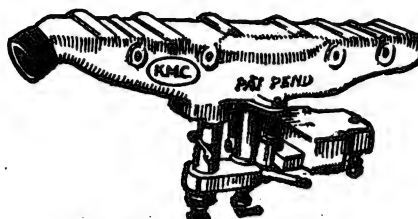
THE K. M. C. TRANSFORMER.

The dream of the automobile world for the past few years has been a carbureting device that would vaporize kerosene, enabling the use of this less expensive fuel in place of the ever decreasing gasoline. The K. M. C. transformer, so called, is said to offer a solution to the big problem, since it enables one to use kerosene as a fuel. At present this device is designed for Ford cars and consists of a combination inlet and exhaust manifold, and a special combination carburetor.

For starting the engine gasoline is



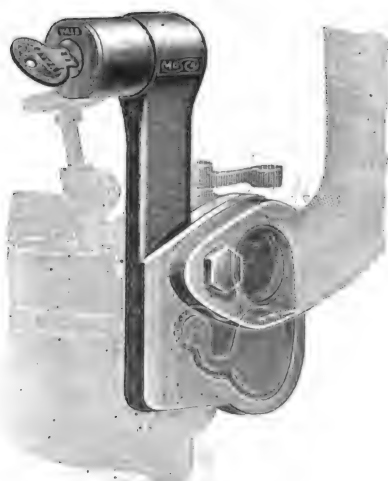
Adamson Five-Minute Vulcanizer.



The K. M. C. Transformer.



The Oxygenerator Outfit.



Mosco Auto-Lock.

used, and when the manifold has been fully warmed the gasoline is shut off and kerosene admitted, the heat of the manifold vaporizing this less volatile fuel to such an extent that no liquid kerosene finds its way into the cylinders. In addition to the saving from the first cost, an increased mileage, when kerosene is used, makes this form of fuel economical.

Manufactured by the Kerosene Motor Co., Peoria, Ill. Price complete with auxiliary tank \$37.

THE OXYGENERATOR.

It has been known for some time that water is one of the antidotes for the carbon trouble and engineers have been working to produce a device that would automatically supply a certain amount of water vapor and introduce it into the engine cylinders. For this purpose the Oxygenerator has been designed.

The Oxygenerator consists of a water container and a copper coil. The container is attached to the exhaust manifold and from it the copper coil carries the water around the manifold several times and into the intake manifold. In passing from the water container to the manifold through the coil the water is heated to a high temperature, producing steam, which entering with the gas mixture breaks up the carbon and prevents it from adhering to the piston, valves or head of the engine. In this way the device acts as a preventive as well as a cure.

Manufactured by the Oxygenerator Co., 1919 S. Michigan Ave., Chicago, Ill. In writing for prices, be sure to give name, model and year of car.

MOSCO AUTO LOCK.

That the auto thief is not being foiled is evidenced by the alarming increase of automobile thefts, as shown by insurance and other statistics. To prevent the starting of the engine the Mosco auto lock has been made. This device is applied to the intake manifold between the carburetor and the manifold. It is fitted with a Yale lock and when the key is turned a gate is closed, preventing the entrance of gas to the engine. The whole device is enclosed in a hardened steel casing, where it is invisible and cannot be picked, nor shaken open. When applied to the manifold a hole is drilled in the hood so that the lock can be turned without lifting the cover.

Manufactured by Motor Specialties Co., Waltham, Mass. Price \$5.

LENNON LIGHT PROTECTOR.

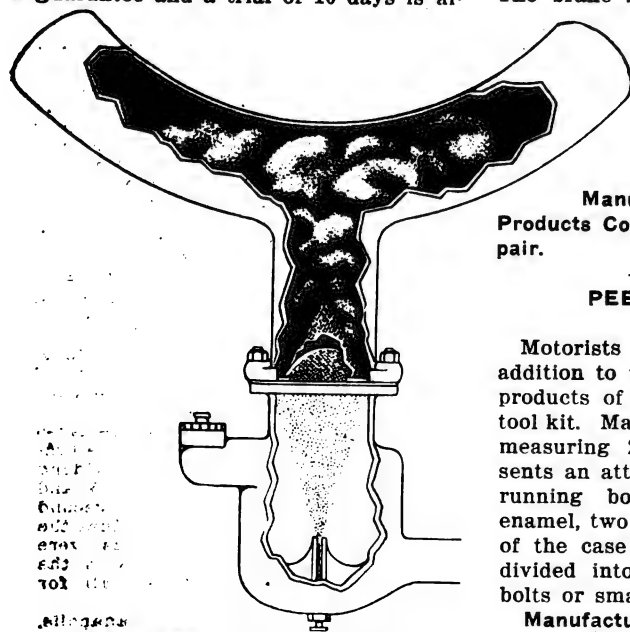
Headlight glare is the unnecessary evil that is being stopped in most states, since a great many of the automobile accidents are caused by the confusing light of improperly adjusted lights. The Lennon light protector is designed so that when it is placed on a bulb the light beams are taken out of the air and thrown down on the road. This device is made in one piece, from high grade spring brass, and fits an under or over-size bulb without danger of injury to the bulb. It is heavily plated and polished inside and out, and having no delicate springs or extra parts, it will not break or get out of order.

The manufacturers guarantee that when this set of protectors is properly placed on the headlight bulbs and focussed, they will meet all requirements of laws in the various states.

Manufactured by J. H. Faw, Inc., 41 Warren St., New York City. Price \$1 per pair.

VORTEX GAS GENERATOR.

To get a perfect mixture is one of the fundamentals of ideal carburetion. Everyone knows that if a lump of sugar is placed in their coffee the drink will be sweetened to a certain extent, though it will be a question of time. If granulated sugar is used, the time is reduced, and if the liquid is stirred the sugar dissolves much quicker. This same condition is true of practically any mixture, and is equally true of gasoline and air. The finer the gasoline particles are broken the more perfect the mixture. The Eastman vortex gas generator consists of two-gauze vaporizing meshes, which are placed between the carburetor and intake manifold. The upper mesh is funnel shaped and so designed that the entering gas is vaporized fully. It is said that with this device a mixture of one-third kerosene and two-thirds gasoline may be used. The device is sold under a guarantee and a trial of 10 days is al-



Vortex Gas Generator Applied.



Fawasco Combination Wrench.



Action of Lennon Light Protector.



Ever Safe Emergency Brake.

lowed, with money refunded if the apparatus is not satisfactory.

Manufactured by Eastman Vortex Gas Generator Co., 16-18 East First Ave., Columbus, O. Price \$1.50.

EVER SAFE EMERGENCY BRAKES.

One cannot be too careful where the question of brakes is concerned, for upon them is dependent the lives of the passengers. The Ford emergency brake is of iron and to meet the demand for a lined brake band the Ever Safe emergency brake brand has been designed. This device is covered with a wire inserted, long fiber, asbestos brake lining material which can be renewed. The band is so arranged as to be adjustable, through shims, for wear, so that the lining can be used until nearly worn out. The brake shoe is made of band steel and covered by a broad guarantee, the makers stating that they will replace any shoe broken in normal use upon receipt of broken shoe at their factory.

Manufactured by Never Break Products Co., Bangor, Pa. Price \$2 per pair.

PEERLESS TOOL KIT.

Motorists will be glad to learn of an addition to the regular Corcoran line of products of what is called the Peerless tool kit. Made entirely of sheet steel and measuring 22x9x7 inches, the kit presents an attractive appearance upon the running board. The finish is black enamel, two coats, baked on. The inside of the case is fitted with a wood tray, divided into compartments for screws, bolts or small tools.

Manufactured by the Corcoran Mfg. Co., Cincinnati, O. Price \$2.50.



Cork Insert Fan Belt and Brake Lining.

CORK INSERTS.

The postage stamp has won fame because of its faithfulness in sticking to its appointed work. It has a worthy rival in cork, in its ability to hold its grip. Almost every other substance known to man becomes polished under constant friction and wear. Not so with cork. Cork avoids becoming slick and slippery as naturally as a duck sheds water. Some transmission fabrics become polished and slippery from service in the Ford car. The same is true of some fan belts. When this happens they do not function properly, the transmission bands do not grip, nor does the fan revolve. Cork inserts in both the bands and fan belts are said to be a perfect antidote for slipping, and since the buttons of cork do not polish or become hard, they do not lose their gripping qualities.

Manufactured by Advance Automobile Accessories Corp., Dept. G 3-1, 56 East Randolph St., Chicago, Ill. Write for prices.

FAWSCO COMBINATION WRENCH.

To lengthen your arm is seemingly a physical impossibility, but when taken as an advertising slogan in connection with a tool which gives the same result, it seems fairly appropriate. Many shirts and coats have been ruined by owners of Ford cars trying to reach under their car to test the amount of oil in the crank case. The tool illustrated herewith is just as effective as one's fingers and saves the annoyance and cuss words. It is a combination gasoline gauge, oil cock wrench and cleaner; and the claim is made that it will not only measure the gasoline in the tank, but provide the only sure means of learning whether there is oil in the crank case, as the pin will prove if the oil cock is stopped up or the oil exhausted. It is made of nickel plated, coppered, Bessemer steel rod, with a very high class finish.

They are put up in complete packages for the convenience of the trade and dealers are furnished with a very handsome counter display card, upon which is mounted one of the tools, which helps considerably in their sale.

Manufactured by J. H. Faw, Inc., 41 Warren St., New York City. Retail price, 35 cents.



Three Views of the New Addition to the Plant of the C. R. Wilson Body Co., Bay City, Mich., a Spacious and Modernly Equipped Daylight Woodworking Factory, Which Will Be in Operation About Sept. 15.

The Business Side of the Motor Vehicle Industry

The C. R. Wilson Body Co. will commence manufacturing operations in its new wood working plant at Bay City, Mich., about Sept. 15. The buildings comprising the plant are being specially equipped and it is considered one of the best and most complete of its kind in the world.

Alexander Winton, president of the Winton Co., Cleveland, O., is on a trip to the Pacific coast and will visit the Winton branches at Seattle, San Francisco and Los Angeles. He will also visit Portland, Ore., where he will supervise the installation of Winton oil engines in vessels built for the trans-Pacific service.

The Chandler Motor Car Co., Cleveland, O., for the seven months ending July 31 reports total earnings of \$1,830,476, as compared with \$1,030,208 during the corresponding period last year.

The Prest-O-Lite Co., Inc., Indianapolis, Ind., has appointed the following individuals and firms as official service stations for Prest-O-Lite batteries: Sheldon Electric Co., 162 S. Park St., Pomona, Cal.; Moore's Garage, Pomeroy, Wash.; Lewiston Cycle and Supply Co., 309 Main St., Lewiston, Idaho; City Auto Co., Centre St., Denison, O.; Central Garage, State St., Grangeville, Idaho; Oscar L. Pidgeon, S. Detroit St., Xenia, O.; Capital City Garage, 1218 Lady St., Columbia, S. C.; Walter Hopkins, Greenville St., Newman, Ga.; G. W. Krone, Senath, Mo.; Ziezler Battery Service Co., 1630 "O" St., Lincoln, Neb.; Walter's Garage, Tifton, Ga.

The Amazon Rubber Co., Akron, O., has declared a dividend of 3½ per cent. on the preferred stock of the company, payable Sept. 1.

The P. Whyte Merritt Co., New York City, have leased a brick building at the northwest corner of 12th Ave. and 133rd St. to manufacture automobile parts.

The Locomobile Company of America, Bridgeport, Conn., is planning the erection of another large factory building.

The Haynes Automobile Co., Kokomo, Ind., started the fourth year of "Light Sixes" with a shipment of several car loads to San Francisco and Chicago. The "light six" motor has not undergone a single radical change since it was introduced three years ago.

The Flak Rubber Co., Chicopee Falls, Mass., has opened a new branch and service station at 212-14 S. Pinckney St., Madison, Wis.

Frank B. Ansted, son of the late Edward A. Ansted, has been elected president of the Lexington-Howard Co., Connersville, Ind., to succeed his father. He will continue as general manager, which position he formerly held. Emery Huston, advertising and sales manager of the company, has been elected vice president, and J. E. Huston will continue as first vice president.

Arthur A. Ansted, another son of the late president of the company, has been elected to the directorate.

The Monitor Motor Car Co., Columbus, O., is building a modern automobile plant with a total of 200,000 square feet of floor space. Two models will be manufactured for 1918, a six-cylinder car with a Continental engine and a four-cylinder car with a Golden-Belknap-Schwartz. They will sell at \$1195 and \$995 respectively.

The Hoffman-Morgan Rubber Co. has been incorporated at Chicago with \$1,000,000 authorized capital to engage in the manufacture and distribution of tires.

The Boone Tire and Rubber Co., Sycamore, Ill., has started work on its new tire and rubber plant at Chippewa Falls, Wis., and expects to have manufacturing operations under way there by Dec. 1.

Briggs & Stratton Co., Milwaukee, Wis., manufacturers of electrical devices and equipment, have hired over 200 women to fill positions.

The Auto Body Co., Lansing, Mich., has orders on its books totaling \$1,750,000. The company's business has doubled in the past year and the increased business will be financed by the sale of \$250,000 unissued treasury stock.

The Premier Motor Manufacturing Co., Indianapolis, Ind., in bankruptcy, will be wound up at the final meeting of the creditors to be held at room 507 Indiana Trust building, Indianapolis, Ind., on Tuesday, Sept. 4, at 9 o'clock in the forenoon. The trustee has filed his final account in the case and it will be passed upon at the meeting of creditors.

The Dunlop Rubber Co., Ltd., London, England, has increased its capital to \$30,000,000 and the directors have been empowered to borrow as high as \$15,000,000, while before their borrowings were limited to \$1,500,000.

C. E. Broad has been elected chief engineer of the Stanley Motor Carriage Co., Newton, Mass. He heads the engineering board, which also includes S. C. Mussey and C. F. Stanley.

Francis C. Schwab was elected president of the Adams-Williams Mfg. Corp., New York City, at a special meeting of the board of directors. C. D. Williams was re-elected vice president and L. W. Schwab was elected secretary and treasurer. The company is making a line of convertible tops or glass enclosures for several makes of automobiles.

Charles Drum has resigned as factory manager of the Springfield Body Corp., Detroit, and will be placed in charge of the body department of the Buick Motor Co., Flint, Mich., on Sept. 1.

Benjamin Briscoe, formerly president of the Briscoe Motor Co., Jackson, Mich., who resigned some time ago to take a rest, has become interested in the airplane business.

ness, it is understood.

Edward E. Sannier, advertising man, who has been connected with the Eastern Motors, Inc., New Britain, Conn., has joined the sales organization of the Simplex Automobile Co., New York City.

Saxon Motor Co. manufactured 1000 cars in July as compared with 700 cars in June and 500 cars in May of the present year. The production schedule is still far below the average for the previous fiscal year, when approximately 2000 cars monthly were manufactured.

The General Motors Corp. board of directors met last week and elected W. C. Durant president and Pierre S. Du Pont, chairman of the board. The following vice presidents were elected: A. G. Bishop, W. P. Chrysler, R. H. Collins, W. L. Day, C. S. Mott, E. Ver Linden and F. W. Warner. T. S. Merrill was elected secretary; H. H. Rice, treasurer, and W. L. Prenskey, controller. The finance committee is composed of L. G. Kaufman, Pierre S. Du Pont, W. C. Durant, J. H. McClement and J. J. Raskob.

The Locomobile Foundry and Machine Co., Williamsport, Pa., has received an order from the Dort Motor Car Co., Flint, Mich., for a sufficient number of engines to keep the plant in operation on full time for three years beginning Oct. 1.

The Alfa Specialty Co., a Worcester, Mass., corporation, has been granted a charter to manufacture automobile parts. The officers are: President, Walter I. Stearns; vice president and treasurer, Walter S. Graffam; clerk, Charles B. Rugg.

B. F. Everitt has been appointed receiver for the Springfield Body Corp. by the Detroit court. The action came as a surprise and on the eve of what was thought to have been a satisfactory arrangement with creditors and the election of Mr. Everitt as president of the corporation.

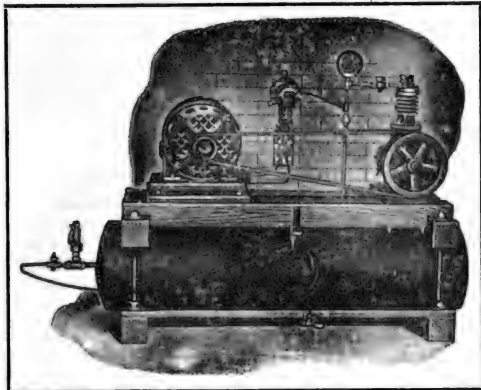
The Air-O-Flex Automobile Corp., Detroit, Mich., incorporated, \$2,500,000, will manufacture a line of trucks with Air-O-Flex suspension cylinders, used in place of springs for suspension and to absorb vibration and road shocks. Officers are: President, G. M. Walker, Jr.; secretary, George L. Nadel; vice president and chief engineer, O. C. Creis; treasurer and consulting engineer, R. A. Weinhardt.

The Maxwell Motors Co. has declared the regular quarterly dividend on the first preferred stock, but passed the dividend of 2½ per cent. on the common stock and the 1½ per cent. dividend on the second preferred stock. It is understood that the directors in passing the dividends were influenced by the various factors in the present situation, which might call for larger capital needs.

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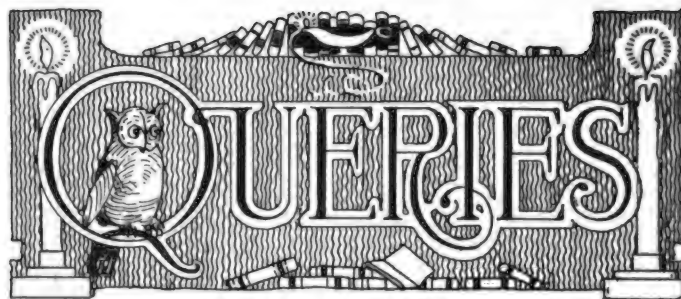
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT ATTENTION DO YOU GIVE THE ENGINE COOLING SYSTEM, AND HOW DO YOU CLEAN THE RADIATOR?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of September. The contest is open to every one.

KEEPING BODY FINISH.

(Chas. Stiles, East Norwalk, Conn.)

First Prize Letter.

It is the desire of every automobile owner to keep his car looking new as long as possible; to do this the utmost care must be taken in the washing of the car, for therein lies the secret of preserving body finish.

When the car is first painted it is given a coat of flat color and finished with several coats of varnish. This final finish must be protected to preserve the appearance of the car.

If mud or road oil is allowed to remain on the finish very long the varnish will become spotted. Before washing the car one should obtain a large, soft sponge of good quality for the body; a smaller sponge for washing the running gear, which need not be of as good a quality; a pall of auto soap of a standard brand, of which there are several in the market; a large water pail, a hose and a piece of chamois skin.

As a preliminary the car is completely gone over with the hose and a light stream of water, this softens the mud and washes a large amount of surface sand and grit from the car.

A good lather of soap suds is then made in the pall, and with the large sponge and suds the car is gone over thoroughly, rubbing very lightly so as not to scratch the varnish with the grit on the car.

Care should be taken to have a small stream of water from the hose playing upon the sponge so as to wash the soap and sand from the car as soon as it is loosened. The soap should not be allowed to remain on the varnish more than a few seconds.

After the body has been thoroughly washed take the smaller sponge and wash the running gear. This sponge should not be used on the body, as it is soaked with oil or grease, which when transferred to the body will be hard to get off.

After thoroughly washing the car it is thoroughly rinsed off with clear water and polished with the chamois. Before

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washing it is well to see that the electric system is protected from any water that may leak in, causing trouble in starting the engine. The later models, however, are almost immune from this trouble.

It is not necessary to use soap every time the car is washed, if it is washed often. If the car becomes spotted with road oil the oil may be removed with a small piece of cotton waste or sponge moistened with gasoline. The spot should be rubbed lightly and will quickly disappear. It should then be washed with soap and water.

To preserve the finish the car should be polished with prepared body polish on a damp cheese cloth, making a wonderful improvement if the polish has become a little dull.

The car should not be washed while the engine is hot, or the finish will be taken off the hood and radiator. The car should not be left standing in the sun or the varnish will check and peel, presenting a poor appearance.

Mr. Stiles' letter shows that he knows how to keep his car looking well and contains a number of helpful points. There are a number of liquid soaps, polishes and cleansers now on the market which remove the mud and road oil by chemical means, without damaging the finish. Perhaps it is better to use a preparation that is known to be harmless to the finish rather than take the chance of damaging the finish by the application of gasoline, though gasoline has usually no effect on the varnish.

The application of body polish or prepared wax is undoubtedly the best method of preserving finishes, since the wax presents an extremely hard surface, through which road oil does not penetrate.

KEEPING BODY FINISH IN CONDITION.

(Joseph Deegan, New York, N. Y.)

Second Prize Letter.

For the sake of beauty the finish of the body of a car must be considered as important. To a certain extent the finish is very delicate and it will not stand much friction or rubbing. Though it will not last as long as the paint, with a little care, and the expenditure of a little time, it may be preserved for quite a time.

Prevention is better than cure, and for that reason the car should not stand in the sun, or the finish will be checked and cracked and the gloss destroyed.

The first step in washing is to flush the car well with a low pressure stream of water, flushing off all of the loose dust and dirt. Next take a pail of luke warm water and with a clean sponge, which is to be used on the body only, carefully wash off all caked up mud and dirt, taking care not to scrub too hard, or scratch the finish. In the water should be dissolved a good quality of automobile soap, or Ivory or castile soap.

After all of the dirt has been removed the body may be polished with a chamois skin and given a coat of prepared wax or other body finish. The chamois skin used for this purpose should be rinsed frequently so as to remove particles of grit and used for the body only.

The running gear may be washed in the same way, using an extra set of sponges and chamois, since to use the same chamois on the body would result in scratches or deposits of oil from the running gear.

Road oil may be removed by using kerosene or gasoline in very small quantities and rinsing it off as soon as possible.

GEARS GRIND WHEN CHANGING SPEEDS.

(S. R., Durham, N. C.)

I have recently purchased a Chevrolet car and though I have owned a car for a long time that did not require the changing of gears, I cannot seem to change the gears of my new car without causing them to grind excessively. Can you give me any advice on this subject?

The changing of gears, noiselessly, is largely a matter of experience and usually depends both upon the operator and the car. To understand the theory, let us go into the construction and action of the gearset and clutch arrangement.

The gearset, which consists of a series of gears which are mounted on three shafts, is connected directly with the rear drive member or propeller shaft. When the clutch pedal

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is pushed forward the gearset is not connected with the engine.

When the car is still, the engine running and the clutch pedal forward, the different gears in the transmission gearset may be meshed for the various speeds without noise. After the low speed has been attained and the clutch thrown out preparatory to the change from low to second, the driving gear upon the main shaft and the driven gear that is to be meshed for the second speed are traveling at different speeds. For this reason there should be a second's pause to give the clutch disc time to slow down slightly before the gears are changed to second speed.

The same is true when changing from second to high. The idea being to keep the speed of the driving and driven gears as near the same as possible.

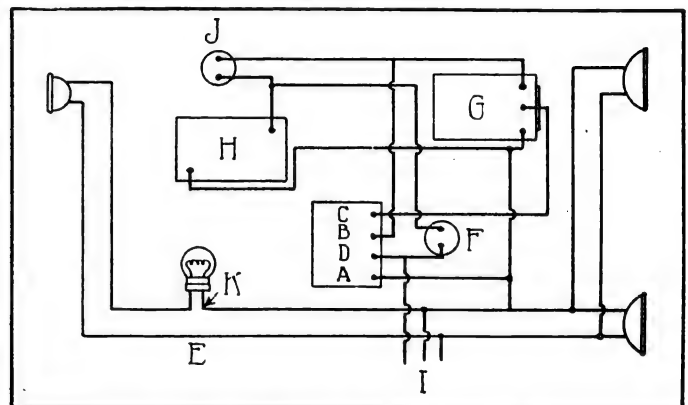
AMMETER CONNECTION ON SAXON CAR.

(F. C. S., Rochester, N. Y.)

I desire to install a dash lamp and an ammeter on a 1916 Saxon four-cylinder car. Can you give me the wiring diagram showing these connections? The controller terminals are marked A, B, C, D.

Given herewith is a wiring diagram of the Saxon four car, showing the proper ammeter connection, together with the suggested connection for a dash light.

A, B, C and D are the controller terminals to which you refer in your letter. F, the ammeter; G, generator; H, battery; I, wires to switch; J, starting switch; K and E refer to main light wires leading to tail light.



Wiring Diagram of Saxon 1916-4 Car.

You will see that all of the current passing from or to the storage battery will pass through the ammeter to the controller and from thence either to the generator or lighting circuit. The ammeter will, therefore, indicate both charge and discharge of the generator and battery, but will not indicate starting current used.

We would suggest that you substitute a 3-4 volt lamp for the present 6-8 volt lamp in the tail light, and connect a 3-4 lamp in series with it as suggested in the diagram. If you do this the dash lamp will act as a tell tale, going out immediately the tail lamp is extinguished for any reason.

If you do not care to use the dash light in this way you can connect one terminal of the light with wire E, and the other with wire K. In this way the tail and dash lights will be independent, but controlled from the same switch. In this case 6-8 volt lamps should be used in both the dash and tail lights.

DETERMINING GEAR RATIO.

(M. S., Philadelphia, Pa.)

Will you please tell me what is meant by "gear ratio" when the term is used in speaking of an automobile, and how this is figured? How can I determine it?

Gear ratio, in automobile parlance, has reference to the number of engine revolutions as related to the number of wheel revolutions. For instance, a gear ratio of three to one means that when the high speed is thrown in the engine crankshaft revolves three times to every one revolution of the rear wheels. The easiest and most practical method of finding the ratio in any car is as follows:

Elevate by a jack one rear wheel so that it is free to turn and make a chalk line, or other mark, at the lowest point on the rim or tire. Just under this mark make a mark on the floor.

Open the priming cocks on the engine, engage the starting crank with the crankshaft of the engine and note its position with relation to some fixed point on the front end of the car.

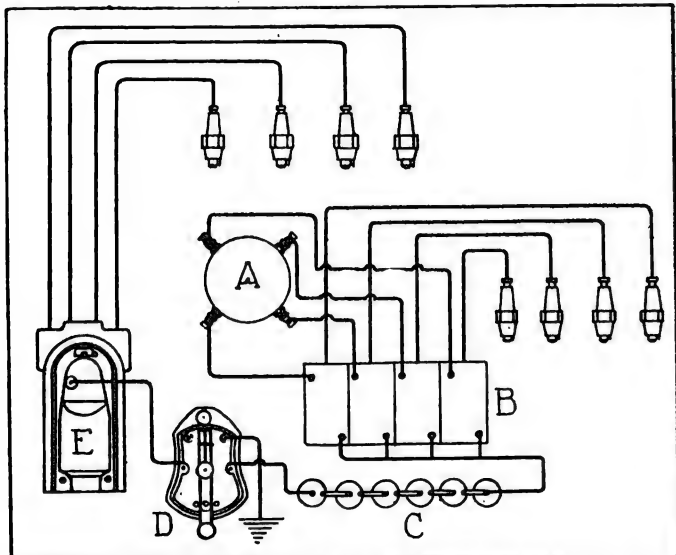
Turn the engine over and have an assistant give the word when the rear wheel has made two complete revolutions, as evidenced by the marks on the wheel and floor coinciding. The number of turns of the crank indicate the gear ratio; hence, if it takes four turns of the crank to turn the rear wheel twice around the gear ratio is four to one.

Two turns of the rear wheel are counted because with the other wheel stationary the travel of the one which is turning will be twice as great as if both were turning, due to the differential action. If both wheels were elevated on jacks, but one turn would be counted, but this not only involves more labor, but is objectionable for the reason that a slight dragging of one of the brake bands might cause one wheel to lag behind the other, making the result inaccurate. In the same manner the ratio of the second and low speeds may be determined.

PITTSFIELD MAGNETO SYSTEM.

(H. B., Boston, Mass.)

I have a Pittsfield magneto and should like to use it on my car in connection with a storage battery. I find that the mag-



Wiring Diagram Pittsfield Magneto System.

neto is fitted with a stationary set of primary and secondary coils, together with a breaker box. Is it possible to use this magneto in such a way that the current from the batteries can be run through the primary winding when the machine is to be started? Must I use an extra set of coils for ignition with batteries?

The Pittsfield magneto is primarily a true high tension magneto and cannot be used in a dual system. This means that the battery system must be entirely independent of the magneto. You will see from the accompanying sketch that practically the only common unit between the battery and magneto system is the switch.

The system requires that for the batteries a special set of coils will have to be installed, a timer and a set of spark plugs. It will not be possible to use the coils in the magneto for the transforming of the battery current.

STEWART VACUUM SYSTEM EXPLAINED.

(A. E. R., Rochester, N. Y.)

Will you please tell me how the Stewart vacuum system works? What causes the vacuum and how does the gasoline escape from the inner chamber into the outer chamber?

A cross sectional view of the vacuum tank of the Stewart system is given herewith. It consists of two tanks or cham-

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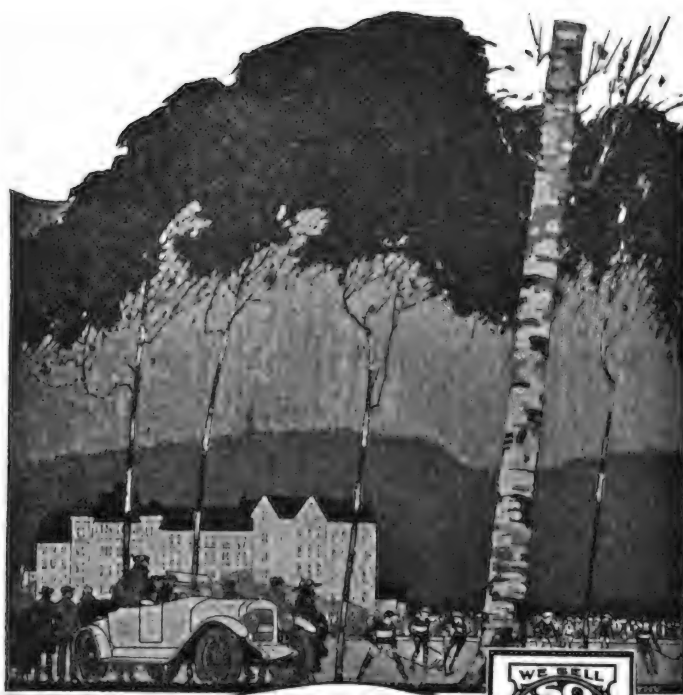
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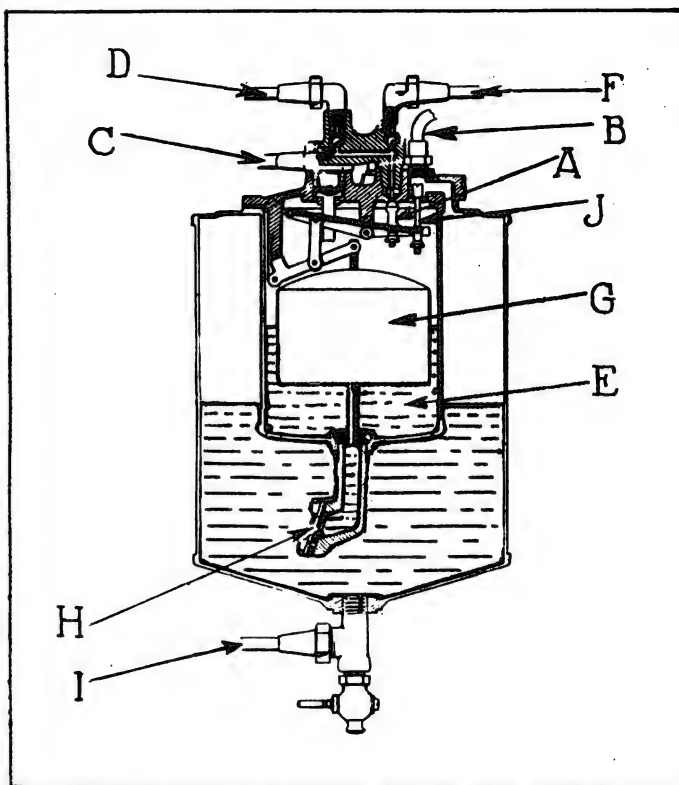
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bers, one inside the other. With the inner chamber E is connected the gasoline tube from the tank at C through the valve A. Tube D is connected with the intake manifold and the suction stroke of the pistons forming a vacuum draw out the air from the inner tank E through the valve A and tube D.

The tube F is connected with a vacuum pump on the dash and is connected with the same passage in the vacuum tank as D is. Its purpose is to create a vacuum in the tank, if necessary, by the pump action, in case the tank should be emptied and the engine inoperative.

Tube B is open to the air and serves as an air vent when the valve J is opened.

Assuming that there is no gasoline in the tank the pump attached to F or the engine is cranked, forming a partial vacuum in the inner tank E. Gasoline is drawn through C into the inner chamber and the float G is raised until the chamber has reached a predetermined level. At this point the valve A is closed and the valve J is opened, admitting air to the chamber. Up to this time the valve H has been kept closed by the vacuum, but as air is admitted through J the gasoline in the inner tank flows through H to the outer tank, from whence it flows through the pipe I to the carburetor by gravity feed.



Cross Section of Stewart Vacuum Feed System.

As soon as the float G drops the air valve J is closed, valve A is again opened and the action continues as before.

LOSS OF POWER IN CADILLAC.

(D. J. M., Greenwich, Conn.)

I am having considerable trouble with my 1913 Cadillac car, which seems to lack power. Unless the car is traveling at a high rate of speed I cannot make hills. To advance the spark causes the engine to pound excessively. I cannot open the throttle all of the way without causing the engine to pound. The carbon has just been cleaned out of the engine and eight new leak-proof rings have been installed. The ignition system has been tested carefully and is all right. Would you suggest a new carburetor? Kindly advise me what the matter might be.

You do not say which universal joint is causing the trouble, and as there are four, two on the propeller shaft and one on each side of the clutch thrust collar, we cannot answer the question except generally.

Perhaps the seeming lack of power and the joint breakage are due to the same cause, excessive friction at some point in the transmission or rear axle. We would suggest that you jack both wheels, remove all the spark plugs and engaging each set of gears, separately try cranking the engine with the hand crank, being sure that the spark is not on so that the engine will be set on fire from possible vapor coming into contact with the plugs. Any excessive friction will be noticed, since the engine should turn very easily under the above conditions.

If there is not excessive friction the universal joint trouble may be due to either or both of two causes. Shafts out of line, caused by improperly centred couplings, or by poorly fitted coupling bolts. The bolts should fit the holes and have absolutely no play when set up. If the holes are large or out of round, there is a tendency for the couplings to slip against each other, bringing great strain upon the bolts every time the engine is coupled to the transmission. Make a careful examination and should the holes be out of round, have them bored larger and larger bolts used, or possibly a new joint.

Loss of power in the engine may be due to either of two causes, poor ignition or improper carburetion. Since you are sure that the ignition system is all right and if you have tried the spark at all of the plugs, we will not go into the possible ignition troubles.

The first thing for you to find out is whether or not the compression is good. If the compression is poor it may be due to gas leakage by either the pistons or valves, and is probably the reason for loss of power. If the leakage is past the pistons you have your choice of two remedies, either have the cylinders rebored or introduce about two teaspoonfuls of of Dixon's flake graphite into the carburetor air intake while the engine is being run. Since the latter method costs but little, it is well to try it first. In case the engine skips after this has been tried, remove and clean the plugs, as the graphite sometimes causes them to foul when it is first put in. One cleaning is usually sufficient.

The remedy for leaky valves is grinding, though the graphite method is sometimes effectual in the case of pitted valves.

Should the compression prove to be good, indicating that the pistons and valves are properly functioning, make a careful examination of the intake line between the carburetor and the engine. Be sure that the manifold is firmly against the block, and that there is no leak between the manifold and carburetor.

A method of determining whether any leakage is present is as follows: Fill a squirt oil can with gasoline and start the engine, throttling it down as low as possible. Starting at the manifold engine connection, squirt a small amount of gasoline on to the joint, noting the effect upon the running engine. Should the engine accelerate or slow down a leak in the intake is indicated and a new gasket should be put in. Make the same test at all manifold connections, wiping off the gasoline at each point immediately after each test.

The spark plugs and plug caps often present places for gas leakage, as do also the valve stem bushings or guides. These points should also be given the gasoline test, as well as a careful examination.

Carefully check up the valve timing and valve tappet adjustments. Turn the engine flywheel over until the mark IO is under the pointer. The inlet valves on the cylinder having the piston uppermost should begin to open. Check off all of the valves by the marks on the flywheel. C means top centre; IO means inlet open; IC means inlet closes; EO means exhaust opens and EC means exhaust closes.

After the engine has been warmed up adjust the valve and tappet clearance so that there is not over 1/32 or less than 1/64 of an inch between the valve stem and tappet.

Poor spring action often causes the valves to act sluggishly, thereby decreasing the power, usually causing uneven running. Each spring may be tested separately by inserting a screw driver between the coils while the engine is being run and pressing the coils farther apart, the effect upon the engine being noted. If the engine is speeded up by this means a new spring should be put in.

We would suggest that you make the following test of the fuel line. Place a catch basin or pail beneath the carburetor and open the drain plug so that the gasoline will flow out. If

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34x3 1/2	10.00	3.30	35x4 1/2	14.50	5.55
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the fuel flows in an even stream, after the bowl has been drained, it indicates a clean fuel line. Should the stream be small or unsteady, clean out the line with a stiff piece of wire; also see that the tank is properly vented. Before getting a new carburetor, as you suggest, it would be best for you to take the old one to the Cadillac service station and ask their opinion on it. Perhaps the needle valve has worn, or the air valve spring is too weak. Since the carburetor was designed for this car by experts it should give satisfaction.

Practically any of the standard makes of carburetors should be applicable to your car. In writing the makers for specifications give the name, model, number and year of your car, as well as the size of the intake manifold.

RESTORATION OF THE OVERLAND.

(Continued from Page 16.)

Before the front part of the main shaft can be removed the propeller shaft coupling must be pulled from the shaft and the main drive gear lock nut unscrewed. The gear and shaft may then be drawn into the case and removed. The ball bearings, with their outer races, may be driven out of the case if replacement is necessary.

Both the countershaft ball bearings are held in place by retaining caps. The cap screws should be removed and the bearings driven out. The shaft can then be slipped through the back of the case, leaving the three gears inside the case.

The transmission reverse idler shaft is held into the case by a nut on the end of the shaft. After this nut has been taken off the shaft may be removed and the double gear taken out of the case.

Before reassembling the gearset, one should assemble the pinion and drive shaft with the ball bearing in place, putting the correct number and sizes of liners between the bearing race and the shoulder on the shaft, so that there will be no play between the bearing and the shaft assembly.

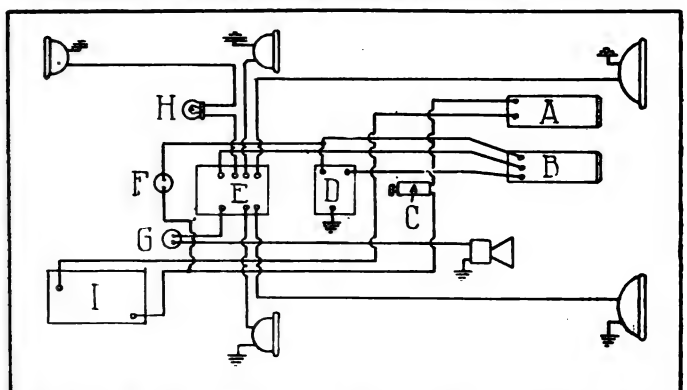
Rear Axle and Differential.

The rear axle is of the three-quarter floating type and the axles and differential may be removed without disassembling the housing.

After the rear axle housing cover has been removed the differential and adjusting collars, with the bearings, are exposed. At the outer extremities of the differential and mounted on the shafts are the adjusting collars. These collars are made in two pieces, held together by two machine screws. Screws should be loosened so that the axles are free.

The axle assembly may be placed upon horses, with the wheels free of the ground, so that the wheels and axles may be drawn from the housing and leave the differential assembly in the housing.

Adjacent to the adjusting collars are the differential bear-



Overland Wiring Diagram: A, Starting Motor; B, Generator; C, Starting Switch; D, Cut Out; E, Switch and Junction Box; F, Ammeter; G, Horn Button; H, Dash Light; I, Storage Battery.

ings, which are fitted with caps. Upon removal of the caps the differential gearset may be lifted from the housing.

The differential gear case is disassembled by the removal of the eight retaining bolts. If the master or drive gear is loose on the case it should be riveted or bolted so that there will be no lost motion.

Before finally replacing the differential gear case the dif-

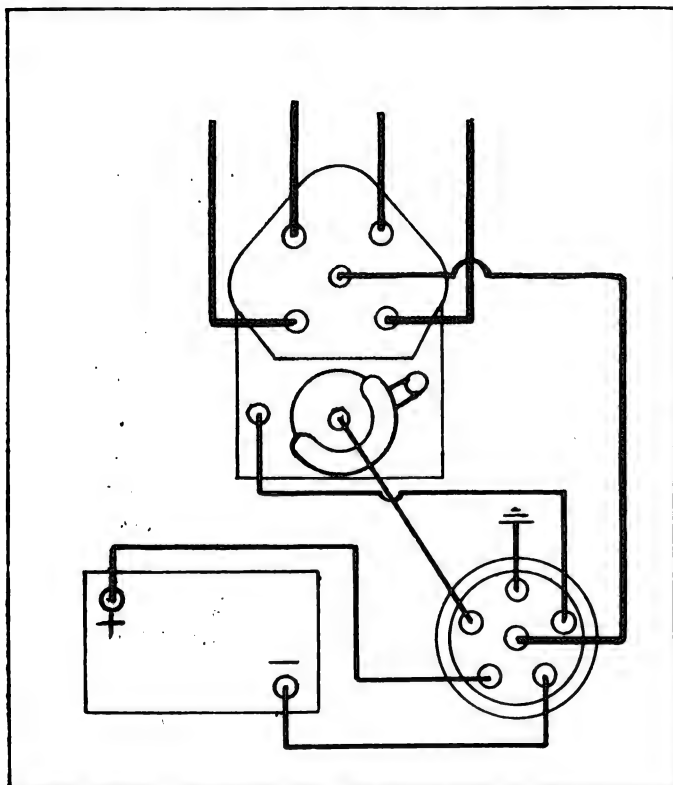
ferential gears and the pinions, as well as the fiber washers, should be assembled and tried by hand. There should be no play in the gearset. If there is any play it should be compensated by the insertion of fiber washers of the right thickness.

After the shafts and wheels have been removed the bearings may be removed for examination. The most careful attention should be given the brake bands and the facing fabric. Too much stress cannot be put on this important item. Should there be evidences of wear in any part the part should be replaced. Repairs to the brake mechanism are not to be recommended.

Readjustment of Gears.

After the rear axle has been reassembled it will be necessary to readjust the master and pinion gear relation. This is done as follows:

Remove the adjustment lock and loosen the screws in both of the adjustment collars, then be sure that both wheels are seated with the brake bands in their places. The differential gear case should then be moved so that the master and pinion gears are meshed their full depth. The adjustment collar on the left side should then be placed so that its face bears against the ball thrust bearing and the adjustment



Method of Wiring Ignition Magneto and Coil System to Battery on Overland Car.

collar on the right side so that its face bears against the housing. Then the two screws in each adjustment collar should be screwed up so that the halves of the collar come together, but not so tight that the collar will not turn on the shaft.

The collar on the left shaft is then turned until the master gear "bottoms" or fits tightly against the pinion. It should then be turned back $1/16$ of an inch to allow the proper clearance between the master and pinion gears for the first adjustment. The adjustment collar on the right side is then turned on the shaft until the play of the differential gearset is compensated.

One of the wheels should then be turned and the differential tested for noise and play. Should there be a grind or lost motion between the master and pinion gears the adjustment collars should be turned until the grind or play is eliminated. When properly adjusted there should be practically no noise from the gears. After every adjustment the two clamping screws on the adjusting collar should be tightened so that the adjustment will not be lost.

The front wheels may be removed by first unscrewing the

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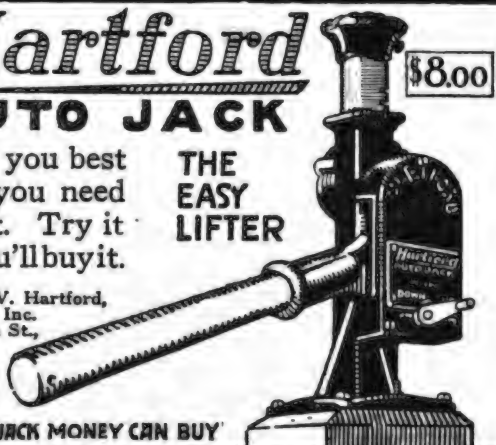
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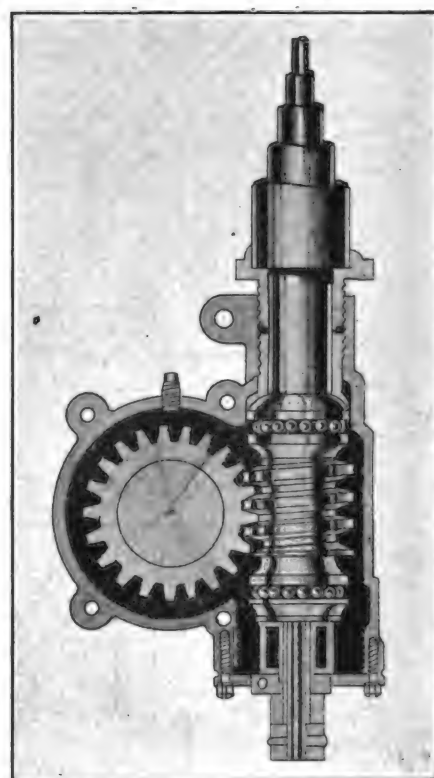
hub caps and the axle nut, then slipping the wheel from the steering knuckle. The steering knuckle bolt should be given a thorough examination and the grease channel cleaned. Grease and dirt should be scraped from the knuckle and the knuckle casting inspected for cracks or weak points.

If the inner roller bearing race is worn it may be driven from the spindle and replaced with new. In replacing the inner or outer ball or roller bearing races the races should never be driven into place by hammering upon the containers with the rolls or balls in place. All of the blows should fall upon the races themselves and the most practical method is to obtain an iron pipe of a size that will just go over the journal or inside the container, but fully rest against the race. The race may then be driven into place without damage. The illustration shows the assembled bearing being driven into place. The pipe rests only against the inner race and the blows of the lead hammer do not fall upon either the outer race or the rolls.

The steering gear is of the worm and worm wheel type and should be given a careful examination. The cover over the worm wheel should be removed and the gear and worm examined. If the worm wheel is worn in only a part of its

circumference the ball steering arm may be removed, the wheel turned to the unworn portion and the arm put back in place. If the worm is worn it should be replaced by a new one. The worm adjustment is made by the slotted adjusting nut at the top of the steering gear housing; the worm wheel adjustment is made by turning the eccentric bushing, which is on the gear housing near the ball arm.

The starting and lighting system is entirely separate from the ignition system and a wiring diagram of each is given herewith.



Cross Section of Overland Steering Gear.

The ignition, which is by magneto and batteries, is wired directly from the magneto to the cylinders. Before putting the magneto timing gear into place the magneto should be coupled to the shaft and the piston in No. 1 cylinder set one inch over dead centre of the firing stroke. The spark lever should be connected with the breaker box and the distributor and breaker cover removed. The magneto shaft should then be turned until the distributor brush is under the point where No. 1 terminal is located (lower right hand corner). The shaft should be rocked back and forth and the point found where the breaker points are separating. The gear should then be put into place and meshed.

To check up the ignition turn the engine over with the hand crank until the piston has passed over top centre of the firing stroke one inch. With the spark lever set at full retard the breaker points should be just breaking and the distributor brush pointing in a direction as would be indicated by the minute hand of a clock at 20 minutes past the hour.

The secondary terminals are then connected in the clockwise order beginning with No. 1, as above, 1, 3, 4, 2. As a general rule the wiring should be replaced. If this is done the danger and troubles arising from short circuits will be avoided.

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PIERCE-ARROW

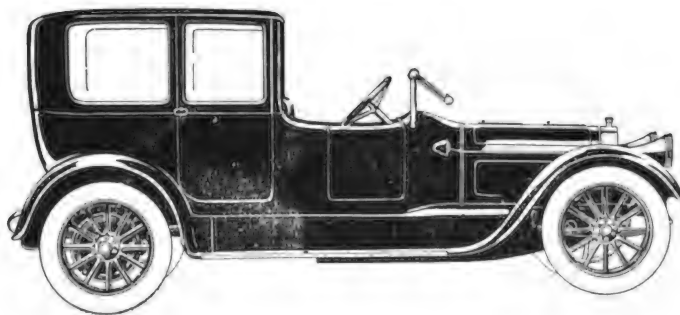
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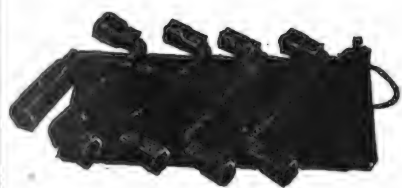


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VOL. LXIV.

SEPTEMBER 10, 1917.

NO. 3.

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SE-MENT-OL

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It does away with tools, tinkering; lets science do,
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See how simple it is! You remove your radiator cap and pour in SE-MENT-OL. Let your engine turn until the leaking stops. Then drain your radiator and refill it with fresh water. That's all. Sound your horn and go on. Time, about ten minutes.

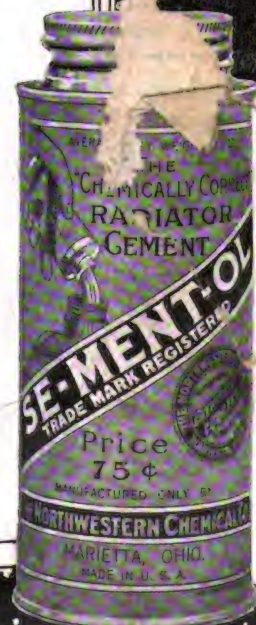
Price, at Your Garage or Auto Supply Dealer's, 75c.

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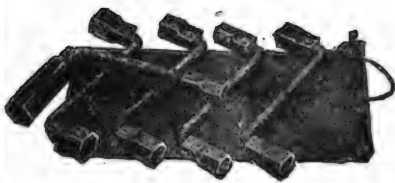
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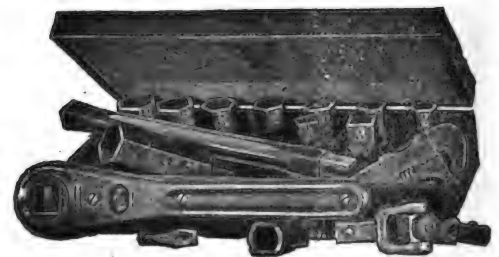
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There are extra plies of fabric in Hood Tires, and Hood fabric is woven to exacting Hood specification. It tests more pound resistance to the inch than any other tire fabric made.

Hood Tires are money saving tires—wear resisting tires—just try a Hood Tire.

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See Automobile Trade Directory and
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are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

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It is sold in sealed containers.

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New 30x3½ Non-Skid

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1917 SALES

FOREIGN BUSINESS \$90,958,243.00

From National Automobile Chamber of Commerce,
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Embargoes Affect Motor Car Exports

Thirty-five Per Cent. Decrease in Shipments to Great Britain, France and Russia During Last Fiscal Year—Big Increases to All Other Countries—Shipments Total 80,811 Cars, Valued at \$90,958,243—Thirty-three Hundred More Vehicles Exported, But Aggregate Value is \$6,507,000 Less—Fewer Trucks and More Passenger Cars.

Figures just issued by the Department of Commerce show that during the 12 months ended June 30, 1917, the United States exported 80,811 automobiles and motor trucks, valued at \$90,958,243, as compared with 77,499 cars, valued at \$97,465,811 during the preceding fiscal year.

Analyzing the official figures, the National Automobile Chamber of Commerce finds that the increase in number of cars exported is due to the larger shipments to most countries outside of Europe, which more than offset the decreases in exports to Great Britain, France and Russia, due to import prohibitions and lack of shipping facilities.

The fact that the aggregate value of exports during the last fiscal year was less by \$6,507,000 than in the preceding year, while the actual number of vehicles exported was greater by 3312, is due to decreased shipments of trucks for war purposes, the average value of which is much higher than the average value of passenger cars exported to countries outside of Europe.

Exports of commercial vehicles and passenger cars during the two years were as follows:

	1916		1917	
	No.	Value	No.	Value
Commercial....	21,265	\$56,805,548	15,977	\$42,337,315
Passenger.....	56,234	40,660,263	64,834	48,620,928

Thus, while the number of trucks exported fell off 5288 in the year and their aggregate value was \$14,468,233 less, the shipments of passenger cars increased by 8600 and their value by \$7,960,665.

Great Britain and France were still our largest markets, despite their heavy falling off in purchases. The former bought \$18,508,442 worth last year, mostly trucks, as against \$26,147,232 worth in the previous fiscal year. France's imports were nearly all trucks and amounted to \$14,691,460, as compared with \$19,137,904 in the 12 months ended June 30, 1916.

Owing to shipping difficulties and internal political

troubles, Russia's imports fell from a value of \$15,686,874 in 1916 to \$6,371,982 in the last fiscal year.

Exports to the rest of Europe combined increased remarkably, when it is remembered that no shipments went to the central empires. The increase amounted to more than \$1,000,000 in the year, accounted for largely by exports to the Scandinavian countries, Holland and Spain. Europe as a whole took slightly less than one-third by valuation of the total American exports.

Aside from the European countries, Canada is America's best customer for motor cars, having increased her purchases by nearly \$4,200,000—from \$7,280,151 in 1916 to \$12,088,787 in 1917.

Next comes Asia and Oceania, with imports of 9716 cars, valued at \$10,093,720 last year—an increase of \$1,450,927. Australia follows, with 5000, valued at \$4,213,874. The British East Indies increased their purchases from \$2,307,739 to \$3,617,351.

In the Americas, after Canada, the West Indies were our best market for automobiles, to the extent of \$4,072,647—an increase of \$1,248,735 over the year before.

The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workingmen.

If you are a member of the Foreign Trade Bureau conducted by the Automobile Journal Publishing Company you can reach 8,000 foreign buyers of pleasure cars, trucks, fittings, supplies, accessories, tools and equipment in more than 81 foreign countries.

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TIMES BUILDING PAWTUCKET, R. I.

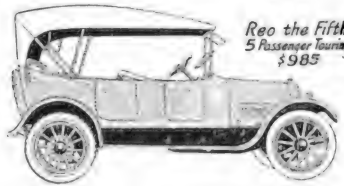
REO

THE GOLD STANDARD
OF VALUES

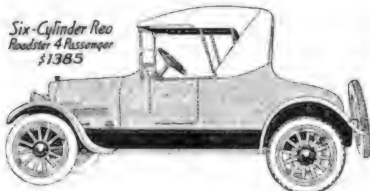
Four-Cylinder Reo
Roadster 3 Passenger
\$985



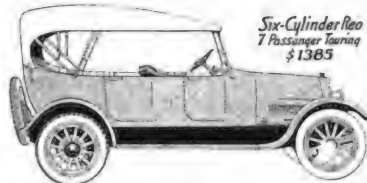
Reo the Fifth
5 Passenger Touring
\$985



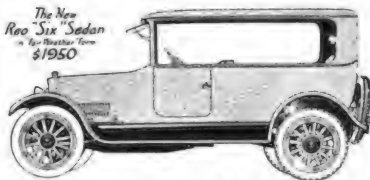
Six-Cylinder Reo
Roadster 4 Passenger
\$1385



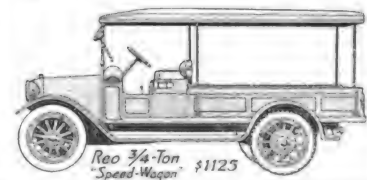
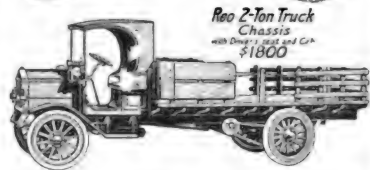
Six-Cylinder Reo
7 Passenger Touring
\$1385



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in Reo Roadster Form
\$1950



Reo 2-Ton Truck
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with Driver's Seat and Cab
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Reo 3/4-Ton
"Speed-Wagon" \$1125

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IT IS UNIFORM—Reos are as popular in the South as in the North—on the Pacific as on the Atlantic Coast.

THEREIN REOS DIFFER from most makes of cars.

IN ONE CITY or State you will find a certain make of car very popular—in the next city they'll tell you they "never heard of" that car.

IF THE DEMAND happens, at times, to be excessive in a certain territory, the factory can switch a few shipments from another to help out.

NOT SO WITH REOS. Every one of the two thousand Reo Dealers is calling for more—calling all the time, too.

THERE ARE NO BARE SPOTS in Reo demand—no luke-warm territory.

AND THAT'S BECAUSE buyers are about the same everywhere. They are all looking for a product of sterling worth—reasonable first cost, low up-keep.

AND THROUGHOUT THE LAND Reo automobiles and motor trucks are known and accepted as "The Gold Standard of Values."

REO MOTOR CAR COMPANY
LANSING MICHIGAN

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Introducing for 1918 A Wonderful New Type Eight

NOW we present for 1918 the handsomest car of the year—the new Jackson Flyer. This remarkable car has a newness and freshness of beauty that is astonishing as to performance. And this announcement also heralds a major achievement in motordom. It signalizes the biggest advance step in the history of the Eight.

The perfect torque of the Eight Cylinder motor was a sensation when first announced a few years ago. Its smooth, flexible, velvet power was a revelation in engine performance.

Now comes the next sensation—the ingenious engineering feat of combining with the remarkable Eight the great Valve-in-Head principle.

Astonishing Results

The merging of these two big principles of engine design brings to the Eight its greatest attainment. It marks the ultimate in the Eight. Note the results: Jackson power is increased 20%. No other motor of

same weight or same piston displacement gives—or claims to give—as much power.

Jackson low gas consumption shatters the economy mark of most Fours and Sixes. 17 to 22 miles per gallon embrace the amazing records of owners.

Jackson simplicity and accessibility is the unexpected in Eights. Everything is within easy reach—any one can adjust all valves in 12 minutes.

Adequate oiling the motor while running is mastered. The foot throttle regulates the oil supply automatically, and in direct relation to the speed of the motor.

Ride in It

Look up the Jackson dealer today. Let him show you the new Eight achievement. See how the Jackson Valve-in-Head Eight gives emergency power of the smoothest kind; fuel economy; utmost simplicity; accessibility; minimum gear shifting; instant pick-up; hill-climbing ability; comfort in traffic at a 1½ mile an hour pace or on the road as fast as you want.

BODIES

All Custom Built in Jackson Shops

7-passenger Touring Car, 5-passenger Touring Car, 4-passenger Flyer, 4-passenger Cruiser, 2-passenger Roadster, 7-passenger Sedan (Springfield type).

Five wire wheels on any model \$100 extra.

Write for Jackson Book

Read about this latest development in the Eight. See what a difference Valve-in-Head makes in the Eight's performance. The complete story of this wonderful new type Eight is all told in the Jackson Book. Write for it today.

DEALERS!

Wire for Liberal 1918 Proposition

Our liberal 1918 proposition is creating new interest and enthusiasm among Automobile Merchants. 1918 territory is being closed and allotments are being made. Wire today for reservation in your territory.

Jackson Automobile Company, - Dept. C, - Jackson, Mich.

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AUTOMOBILE JOURNAL

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a Copy

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Treasurer . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

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WHAT is built in a car? Service. And again, service. This is the keynote of the worth of an automobile and any attempts to estimate in any other terms the most valuable transportation vehicle which has ever been brought forward for the use of man in any age is simply a futile effort by some ill-advised individual, body or publication to throw dust in the eyes of 4,000,000 car owners. The article "Service Value of Used Cars Vs. Set Prices" in this issue points out again with added emphasis that the real worth of a used car is lodged in its condition and serviceability, and that this does not depend in the slightest degree on the year of the model. Without doubt the estimation of a car's value simply on its age, without regard to its other points of merit, is a lazy man's way of wasting hundreds of dollars of other men's money, if nothing worse. The Automobile Journal stands for the service value in a used car every time, and especially as against that arch foe of manufacturer, dealer and owner, the set price schedule based solely on the year and model of the car.

IN RESPONSE to a number of requests from our readers addresses are supplied in the key to used car bargains published in this issue. This compilation is carefully made from the press of the several cities represented and, on the strength of press reliability and general business integrity, commends itself to the motorist for the information it contains.

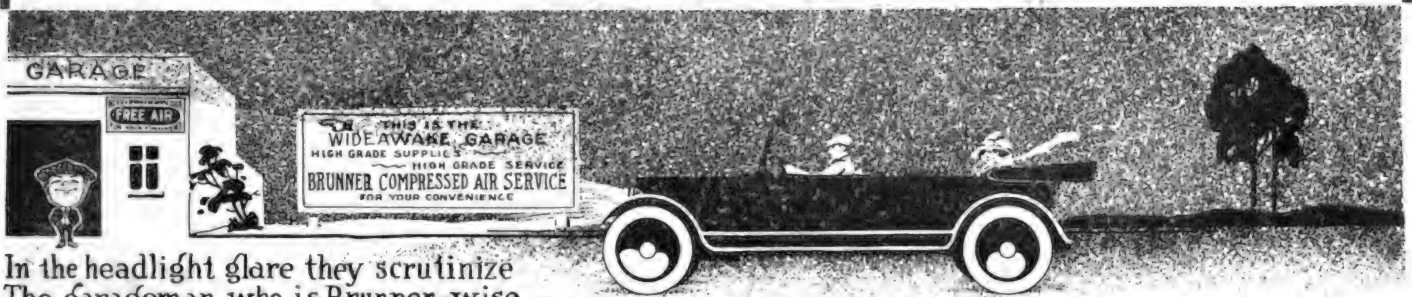
PERHAPS fewer motorists than is popularly supposed break down their tires by running in the car tracks. But legions of them wrestle with the problem of removing carbon deposit, which is the subject announced for contributors in the idea exchange.

WHAT kind of a car do you own, and are you reading every one of the construction stories that appear in the Automobile Journal? No matter what car you own you should read every story for the reason that in each article is discussed some general subject that may be relative to your car. The first story dealt with the Ford car, and took up in detail the method of grinding valves; the second article dealing with the Chevrolet, gave directions for scraping bearings; the third, dealing with the Overland, gave some cooling system hints that are applicable to many cars. Each story contains, not only details of construction of a special car, but also repair kinks that might be invaluable to the new owner in repairing his own car, even though it might be of a different make. Read all of the stories, there is no better course of instruction than this series.

SUBSCRIBERS sending notice of a change of address should bear in mind to send the old address as well as the new one so as to insure that the change may be effected promptly.

CURRENT opinion in the automobile industry is that war demands will speed, rather than check, national expansion. Every passing day brings a fuller realization of the imperative need of other means of carrying than are at present supplied by the railroads, rivers and canals. While it is regarded as certain that the present transportation facilities outside of the automobile will feel the impetus of national expansion, and all will be called upon to sustain their share of the extra burden, it is also strongly shown that from the very nature of things in this country—its wide expanse, the necessity for quick communication—the burden falls upon the automobile.

BRUNNER



In the headlight glare they scrutinize
The garageman who is Brunner-wise —
On the Brunner sign they rest their eyes
And stop for air and — some supplies.

YES, **BRUNNER** SERVICE SATISFIES

SERVICE that satisfies is the one big dominant factor in the administration of the garage business of today, and the success of the modern garage is dependent entirely upon the class of service it renders.

Mr. Garageman, when they flash their headlights on you at night, are you prepared to render such service? Does your service satisfy? If not, then you should seriously consider the matter of installing Brunner Service, because Brunner Service always satisfies.

INCREASE YOUR INCOME BY IMPROVING YOUR SERVICE

INSTALL A BRUNNER AIR COMPRESSOR

Seven Standard Sizes and Any Number of Combinations to Choose From.

No Restriction of the Lubrication to Invite Disaster.

No matter how good your compressed air service may be, Mr. Garageman, Brunner Service would be an improvement, because it would strengthen your standing with the trade you have and—it would bring to your door the trade of the Brunnerwise Motorist and increase your sales of gasoline and supplies, because the Brunnerwise Motorist is a liberal spender and appreciates the service that satisfies.



The Brunner is the pioneer of the present day air compressors—it was not put on the market ten years before the garage was thought of—it was designed and built especially for the garageman's use and it has been consistently demonstrating its sterling qualities to the garageman in the garage ever since we have had garages.

The sale of the Brunner Air Compressor to the garageman is far greater than any other air compressor made—the reason is obvious.

YOU CAN BANK ON A BRUNNER AIR COMPRESSOR

And any one of the high-class reputable jobbing houses who distribute the Brunner Line will be glad to recommend and guarantee a Brunner outfit to meet your special requirements. We will be glad to send you the name of the Brunner Jobber covering your town, and our engineers will be very glad to assist you in making your compressed air service—a service that satisfies.

Our No. 14 Catalog and Garageman's Handbook on Compressed Air are yours for the asking. Write for these books today and get the facts regarding the Garage Air Compressor situation.

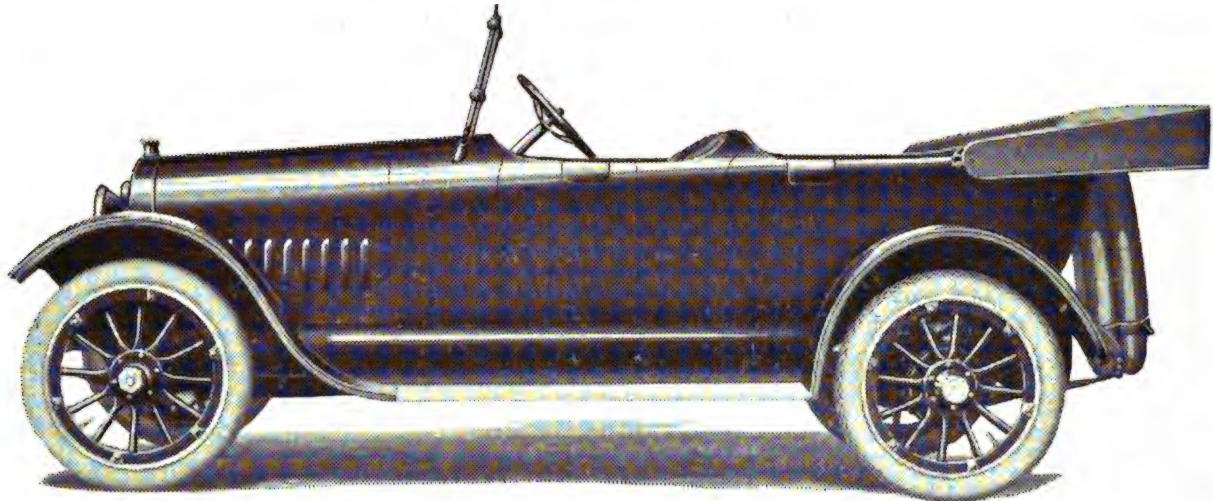
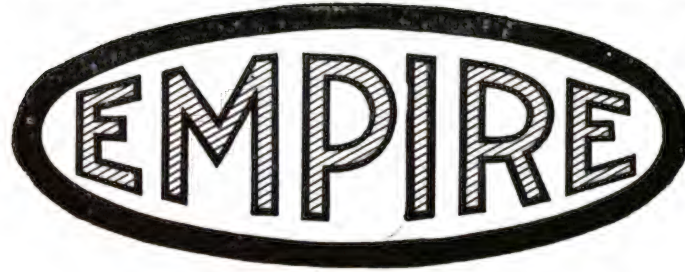
BRUNNER MANUFACTURING COMPANY

Main Office and Plant:
**UTICA,
N. Y.**

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**CINCINNATI,
OHIO.**



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START THE NINTH SUCCESSFUL YEAR WITH US

For eight years Empire has built the best cars that could be made for the price asked. This policy has made the splendid reputation the Empire Company has always had.

Now Empire begins the ninth successful year, building better cars than ever and going ahead stronger than ever before.

We invite successful dealers who desire to tie up with a strong company to get in touch with us immediately. It may be possible for you to share in the big Empire success if you act quickly.

**Four and Six Cylinder models from \$1125 to \$1685.
A model for every motoring requirement.**

Write for catalogue and full particulars of our liberal dealers' selling plan.

F. A. DUTTON MOTOR COMPANY, INC.

Ball Square,

West Somerville, Mass.

Distributors for New England Territory

**Empire Automobile Company, Indianapolis, Indiana
Established 1908**

(When Writing to Advertisers, Please Mention The Automobile Journal.)

THE Automobile Journal

VOL. XLIV.

SEPTEMBER 10, 1917.

NO. 3.



Dealer Tom Botterill Teaching Denver Boy Scouts the Service Value in a Car.

SERVICE value as the basis for determining the worth of a second sale automobile, as asserted and maintained by the Automobile Journal for several months past, shows wider acceptance daily. Take it in general, the manufacturer, dealer and owner, separately and collectively, have an interest in what is built in their cars which no graduated chart of depreciation can successfully oppose. Large movements of used cars, it is found, are accomplished under the application of only the soundest rules of business. The law of supply and demand, together with the merit in the article, are the basic factors underlying the ever improving market for used cars and new cars in the experience of a season which has been remarkable for the many great problems it has presented to the motor vehicle trade at the same time that the nation set itself to the huge task of a foreign war.

Service is easily the master note of the day in all lines, and it has an intensive application to used cars. Directed along systematic channels the latent usefulness in every individual and object is the measure of greatest worth. Take the lesson in the illustration at the head of this page, for instance. Tom Botterill, a Dodge dealer in Denver, enlisted the Boy

Scouts in his service department and at regular sessions instructed them in the care and operation of motor cars. With customary enthusiasm the boys absorb every detail of the car and its service value, and soon are graduated, qualified to render assistance to motorists at any time. This they are doing with great success, much to the convenience and profit of car users.

Blending of Service and Value.

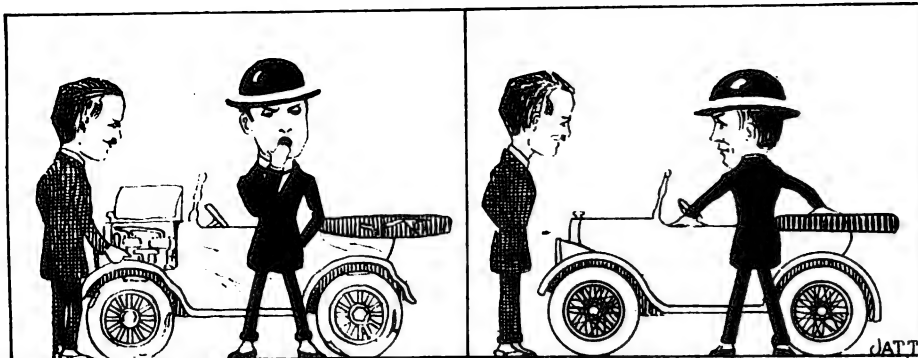
The close relation of service to value becomes equally apparent when the object is so closely linked with the indi-

vidual as is the case in the automobile. As used cars become better understood in the terms of the services they render to their owners, or will render to their intending owners, the fears that have often been entertained regarding them dissolve like the mist before the morning sun. Recognition in the trade, as well as by the public, of the service values in used cars spells defeat of false, low valuations fixed by arbitrary charts of depreciation.

Set prices on different models cannot continue a drag on the automobile trade when the Automobile Journal's campaign of education shows in what the real worth of a car consists—the service that is built into it for the motorist. The merit remaining in a used car is readily shown to be dependent on one element and one element only. This element is "condition." Condition, however, subdivides into a number of phases, according to the varying viewpoints of judgment. The mechanical condition is the all-important phase, as that determines the great questions of serviceability. Outward condition and appearance bear on the subject of style and taste, while the inward condition determines the point of performance, the ultimate reason for which every owner owns a car.



Meet a Five-Year-Old Car and What Expresses Itself More Than the Serviceability It Gives.



A Car Mechanically Sound Needs Also to Be Made Pleasing to the Eye in Order to Win a Customer's Favor.

The one big fact that cannot be evaded is that the automobile owner knows the service worth of his car. He is acquainted with its mileage record and condition as no one else can be. Considerable stress is sometimes laid upon the owner's high estimate of his car as being due to sentimental associations. In this hardheaded business age, however, the service a car gives is taken of far more account than sentimental feelings. It establishes a form of worthy pride resting on a solid foundation; a factor demanding recognition and weight in all transactions affecting the disposal of a man's useful property. The set price plan advocated by an individual, association or publication runs counter to this and many others of the owners' best interests. Nor are the manufacturers and dealers benefited until they discard it. It is more than interesting in this connection, therefore, to note that there is an upward trend in the used car market and all indications point to the development of conditions that will parallel those already surrounding the automobile trade in England, where, owing to war conditions, there is such a light production of passenger cars that second hand machines up to five years old bring from 75 to 95 per cent. of their original cost and in some cases more than they were originally sold for.

Dealers, who on the impulse of the moment may have indorsed the fixed price idea, soon realize what an impossible proposition they are fostering. It does not take much time or any great reasoning to see the futility of appraising the value of a used car by a chart or set form, arbitrarily establishing its market value.

The Problem in Other Merchandise.

It begins to dawn on the trade that the problem of the used car is in no way different to that which has been solved in the typewriter, cash register, adding machine and in similar lines of trade. It has been looked upon as a side issue and given less attention than it really demands, with the result that many dealers did not come to realize the magnitude of the problem until they found themselves with a white elephant on their hands in the shape of a large number of used cars. In many instances the profits of several years' business were tied up in used cars before the dealer awoke to the necessity of applying a remedy.

There was absolutely no way of avoiding the problem, as nearly 80 per cent. of all new business is contingent on a trade-in of a second hand car, so progressive dealers studied out ways and means of meeting the situation.

At one time used cars were sold much after the manner of junk, "as is" being a term generally used as a basis of sale, meaning that the seller guaranteed nothing and the buyer took the car unconditionally. This method of distributing the used cars naturally was a failure, as it incited suspicion at the start and made prospective motorists particularly wary.

Car dealers and used car dealers soon perceived that there is something radically wrong in that method of merchandising, as no other line of goods was ever successfully marketed on such a plan.

Winning Public to Used Cars.

The people who bought cars on the "as is" plan, when anything went wrong, felt that they had been imposed upon and the seller could never figure on that customer as a prospect again. The heavy depreciation that was charged against most cars was responsible for this condition and the condition would still obtain in the trade if the best friends of the motor car had not discovered that a remedy lay in maintaining a higher value for the used car, enabling repairers to fix the cars, put them in good running order and stand back of them with some sort of a guarantee. This business policy not only makes it possible for the dealer to dispose of his used cars more readily, but in turn has created a far

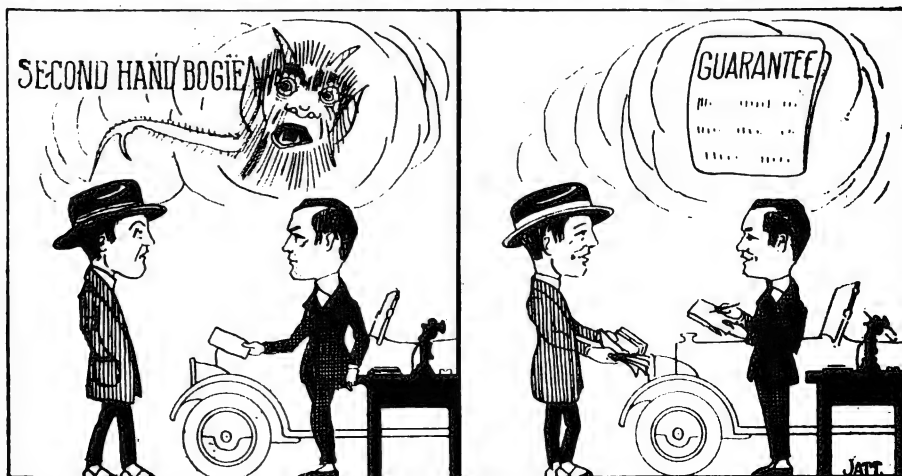
more favorable attitude on the public's part concerning the values of used cars. A glance at the advertisements in the press, some samples of which are shown on pages 33, 34, 35, 36 of this issue, reveals a new era in the used car business. Practically every dealer offers some kind of a guarantee and they make specific statements as to the condition and appearance of the cars offered, while others go further and give a certain amount of free service with every car sold, to be used whenever needed. The extent of this free service, however, is regulated in accordance with the price paid for the car.

In fact, the business today is being operated on a similar basis to that employed in the distribution of new cars and some of the dealers go to the extreme of practically rebuilding a car before offering it for sale. They not only restore its mechanical condition in every respect, but also renew the finish if it is necessary. This plan not only gives the users of that class of car considerable pride in its ownership, but it serves to maintain values so that it is always easier to market a new car of that make and the used cars can be handled with greater leeway owing to larger margin of profit afforded.

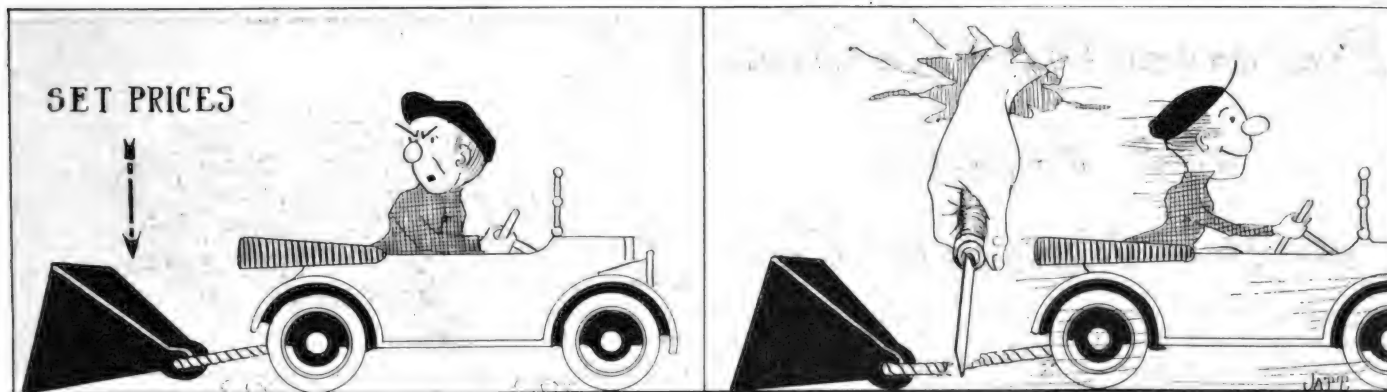
Cultivating the Trade.

Used car dealers even go so far as to cultivate their trade carefully, with the result that they can sell the same customer again and again, and it is a known fact, from figures kept by one dealer, that many motorists buy several used cars before they buy a new car.

It is far easier also to convince a person that the service claimed is actually contained in a car if it makes a good appearance. Everyone is susceptible to impressions and is largely influenced by them in making a purchase of any kind of article, which fact makes it more difficult to dispose of merchandise if its appearance is poor. Some merchandise can show marked wear externally and yet its service value can easily be recognized, but in the case of an automobile, scratched paint, dented bodies and guards, ragged tires will prejudice a machine in a man's eye to a point where, even if it is mechanically perfect, the



The Very Name of Used Car Brings Fearful Visions to Many Unless Met with a Straightforward Proposition.



Cutting the Incubus from the Used Car Lets It Speed Away on Real Value and Affords Relief to the Industry, Which Has Been Dragging a Heavy Load Unnecessarily.

dealer will have great difficulty in establishing the fact to the customer's satisfaction.

An expenditure of \$25 to \$50 on the car would not only make it presentable, but would easily enhance its value in the customer's estimation to a point where the dealer could not only make a quicker sale, but a sale at a price that will return the money outlaid for renovation. The worth of any article does not rest solely in its intrinsic value, but is based also on its general attractiveness, which fact shows that any treatment a car may receive enhancing its appearance is actually increasing its market value.

Comparison with British Markets.

The conditions in this country governing used car values seemed to have evolved along similar lines as in England, where prices for a while showed a marked depreciation, until the business was placed on a sounder basis, when they advanced rapidly.

When it was announced in England last April that no more gasoline licenses would be issued to operators of passenger cars, used cars were almost a drug on the market and a month later there was practically no trades for them except at sacrificial prices. By the latter part of June and during July the prices for used cars in England began to strengthen materially and today are very high, as stated earlier in this article. The advance in England was of course due to the fact that few car manufacturers continued the production of cars when war came. Hence many business men, who were in dire necessity to provide transportation facilities, bought passenger car chassis and fitted them out as commercial vehicles. The practise has increased steadily. In fact, the demand is so great that a large number of advertisements are inserted in the trade press and daily papers in England inquiring for used cars.

Some idea of the extent to which prices have advanced there is shown in a report brought to this country recently by an automobile dealer of New Zealand, who stopped in England on his way home. He states that light cars which sold at \$1000 to \$1500 several years ago now have a market value of from \$2500 to \$3000 regardless of their age.

Recognition of Service Value.

There is no doubt, in view of the pres-

ent trend of events in the situation, that people in this country will be as quick to recognize the service value in the used car as the people of England. Immediately they begin to wake up to this fact the question of car depreciation will cease to trouble either the dealer or owner. Many manufacturers in this country have already issued warnings of a scarcity of new cars to be felt this season, and there are many elements in the situation to warrant a belief that the scarcity will materialize. If it does similar conditions surrounding the used car market may be expected to obtain here as obtain in the present in England. When once fairly pointed in the right direction people will quickly become educated to the fact that car value is really measured in service miles and performance, and not in the date of manufacture or lines of style.

Such a situation of course will rebound to the benefit of the car manufacturer and dealer, as it will place the new car on a sounder market basis, where

the buyer will not be deterred from fear of the heavy depreciation he has been obliged to stand in the past and motorists will be more inclined to buy a new car each year than ever before.

High Second Hand Value.

One of the leading car manufacturers of the world, located in England, uses whole page advertisements in the trade press to bring to the attention of the public the high second hand value of his products as a means of indicating their quality. The last ocean mail brought a very interesting advertisement of this nature, which is as follows:

WHAT'S BUILT IN THE CAR.

The excellence of a production can be gauged by its second hand value. Standard 12-16 horsepower SUNBEAM cars made by us in 1914 and sold for \$446-\$1000 retail, have a present market value of from \$500 to \$595 and that after three years of hard service.

Here is a strong illustration of the car's value being determined entirely by its service record and possibilities.

COMING EVENTS

RACING CONTEST SCHEDULE.

Providence, R. I., speedway race, championship.....	Sept. 15
Allentown, Pa., track race.....	Sept. 22
Trenton, N. J., track race.....	Sept. 28
New York, speedway race, championship.....	Sept. 29
Danbury, Conn., track race.....	Oct. 6
Uniontown, Pa., speedway race.....	Oct. 6
Richmond, Va., track race.....	Oct. 13
Chicago, speedway race, championship.....	Oct. 13
New York, speedway race.....	Oct. 27

SHOW CALENDAR.

Milwaukee Show, State Park Fair, West Allis.....	Sept. 9-15
Chicago, National Exposition of Ford Accessories, Coliseum.....	Sept. 22-29
Buffalo, N. Y., closed car show, Automobile Dealers' Association....	Oct. 1-6
Syracuse, N. Y., first annual closed car show.....	Oct. 22-26

Dallas, Tex., Auto and Accessory Dealers' Association State Fair..	Oct. 23-28
Denver, Col., Automobile Trades' Association cars and accessories show	Nov. 12-18
New York, National Automobile Show, Grand Central Palace..	Jan. 5-12, 1918
Washington, D. C., Washington Automobile Trade Association carnival and open house week..	Jan. 11-18, 1918
Montreal, National Motor Show of Eastern Canada, Montreal Automobile Trade Association Jan. 19-26, 1918	
Boston, Boston Automobile Dealers' Association Show, Mechanics building	March 2-9, 1918

MEETINGS.

French Lick Springs, National Association of Automobile Accessory Jobbers.....	Sept. 10-14
Atlantic City, N. J., Equipment Service Association.....	Sept. 11-12
Atlantic City, N. J., mid-season meeting, M. & A. M.....	Sept. 12-14

Processes for Overhaul and Repairs of the Maxwell Car

This is the fifth of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The sixth article of this series, which will appear in the Sept. 25th issue of the Automobile Journal, will be devoted to the Studebaker car.

BUT few changes in design have been made on the Maxwell car in the past few years, so that the general outline of repairs is the same for the later models.

The engine is of the L head type and forms a unit with the transmission gearset. It is supported in the frame at three points, the two members at the rear also serving to support the transmission gearset.

Before beginning the work of repair the wiring should all be disconnected from the engine, motor generator and magneto, and the terminals tagged so that they may be replaced. The radiator should then be drained and the hose connections removed.

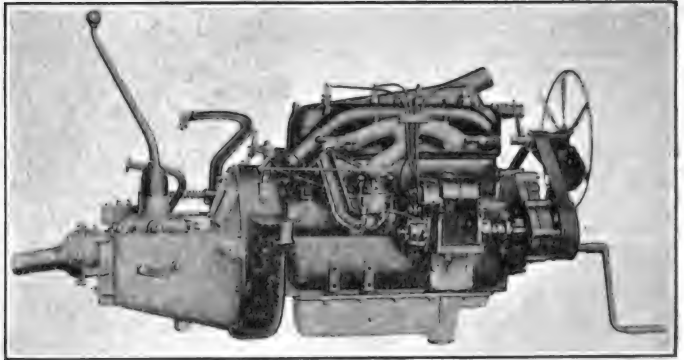
The cooling fan is mounted upon an arm, which in turn is fastened to the cylinder head by a long bolt. This bolt must be removed and the 14 cap screws which fasten the head to the cylinder taken out. The head may then be lifted from the block, giving access to the cylinders and explosion chambers.

With a putty knife, a stiff brush and kerosene the carbon may be removed from the cylinders, explosion chamber and valves. To facilitate the work the exhaust and intake manifolds, together with the carburetor, should be removed. After the exhaust has been disconnected and the throttle rod removed the two manifold clamps may be removed and the manifolds taken from the engine.

The valve covers are held in place by two hand nuts. These are removed and the springs lifted with a Y iron or valve lifter, permitting the removal of the valve pins and valves. After the valves have been numbered and removed the valve pockets or chambers should be cleaned carefully.

Points in Valve Grinding.

For grinding the valves a small round headed screw driver may be used to do the turning. Grinding compound may be



View of Maxwell Power Plant and Gearset Assembly.

obtained from the automobile supply house. The essential point regarding grinding is that but little pressure is used. The motion of grinding is reciprocal, not rotary, so that the valve should be turned about quarter round and back a number of times, then half around and quarter back so that every part of the valve face will be ground against every part of the seat. The turning of the valve a full revolution will score circular grooves, which soon fill with carbon and cause poor valve action and consequent loss of compression.

The grinding compound must not be allowed to get into the cylinders or valve guides and should be washed carefully from the block with kerosene at the end of the grinding process. But very little compound is necessary for each valve, and, when used sparingly, there is little danger of its working into the engine or running parts.

Before replacing the valves the amount of play between the stems and bushings or guides should be noted, and should it be noticeable, the guides should be replaced with new ones. The guides are driven into the engine block from below and may be driven out with a metal bar and hammer from the top, taking care not to damage the valve seat or break the casting.

It is essential that the valve stems fit the guides, for if there is the slightest leakage at these points, loss of power and excessive gasoline consumption will result. In addition to this the engine will not throttle down or start easily if the leakage is great.

The valve springs should be very stiff or the valve action will be poor and the valves will not seat properly. Examine each spring for breaks or weak places. As a general rule springs that can be replaced without the use of a valve lifter or Y iron are too weak for quick action, and new springs should be put in their place.

While the head is off the engine take a stiff wire and scrape out all of the water passages. This will facilitate the cleaning of the cooling system.

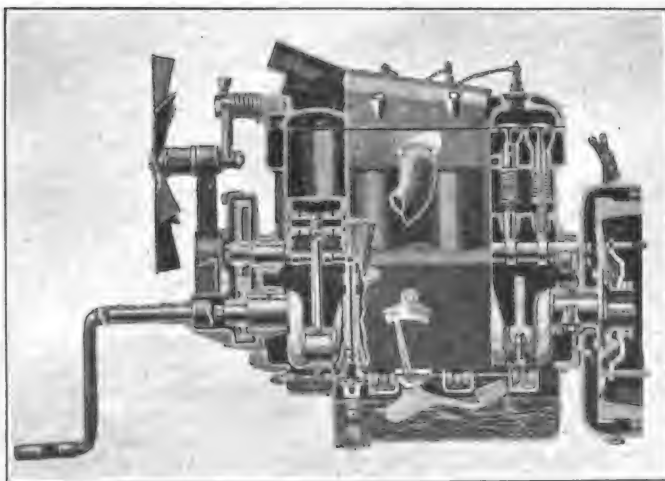
Make a careful examination of the spark plugs, remove the nut which holds the porcelains in place and clean all of the parts with the exception of the gaskets in kerosene or gasoline. When the porcelains are replaced be sure that a gasket is placed on each side of the porcelain shoulder.

Cleaning Oil Reservoir.

The base of the engine forms the oil reservoir and the next step is to remove it from the engine by taking out the bolts and carefully lowering it from the car. The old oil should be removed and after it is strained through a cheese cloth used for general lubricating purposes, but not in the engine. The reason for this is that with the present day fuel the oil usually becomes mixed with a certain amount of precipitated kerosene and loses some of its lubricating properties, hence it is a good plan to replace the oil with new after about 2000 miles of running.

After the oil base has been removed the oil pans should be taken out, the oil pump retaining bolts removed and the pump taken out and cleaned. The oil case and oil pans should receive a thorough cleaning before they are put back into place. The oil pump exerts its suction tubes which lead to the oil troughs and these tubes should be cleaned with a flexible wire and flushed with kerosene.

The oil indicator is fitted with a float on the end of the arm and should the float be soaked with oil it should be



Cut Away View of Engine, Showing Location of Parts and Oiling System.

placed in an oven until the oil has been baked out of it. After it has dried thoroughly it should be given three coats of orange shellac.

As a general rule in replacing the oil base a new gasket should be used. The gasket should be liberally coated with shellac and clamped into place immediately. When gaskets are replaced all of the abutting surfaces should be cleaned carefully so that the fit will be perfect.

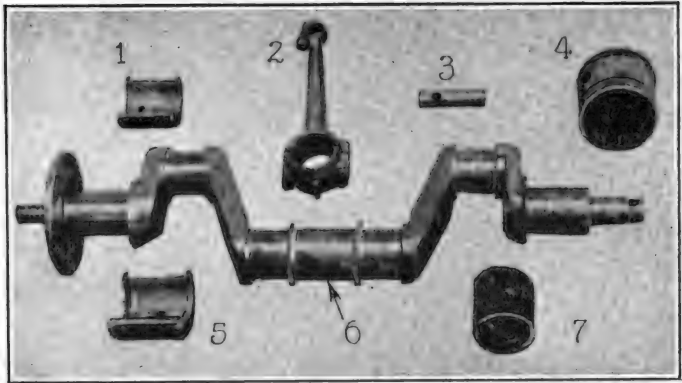
Connecting Rod Bearing Adjustments.

With the oil base removed the four connecting rod bearings may be replaced or repaired. The connecting rod bearings may be readjusted or tightened in two ways, either by the removal of the shims or by the filling of the caps. As a general rule after the shims have all been removed the babbitt has been worn so thin as to require replacement, yet in some cases it is permissible to remove the cap and, with a fine file, carefully file off the surface of the cap. It is essential that the surface be flat and smooth, however, and this operation requires much skill.

When either new bearings are used, or the old are tightened, the babbitt should be scraped to conform with the crank pin and insure a good bearing surface. If the bearings are to be replaced the caps should be removed and the piston drawn up through the top of the cylinder block.

The engine is lubricated by both splash and force feed. The connecting rod bearings are bored so as to allow the oil to enter. The holes should be cleaned and the channel which extends through the oil dipper cleansed.

Wear is seldom found at the upper end of the connecting rod or in the wrist pin. Should there be any play the wrist



Crankshaft and Piston Parts: 1, Upper Rear Main Bearing; 2, Connecting Rod; 3, Wrist Pin; 4, Piston; 5, Lower Rear Main Bearing; 6, Crankshaft; 7, Front Bearing.

horn should be taken off. As the motor generator is secured to the flywheel housing by cap screws, three of which are inside the housing, that unit may be left until the engine is taken out.

Remove the four bolts which secure the universal joint ball housing to the transmission gearset. Next remove the four nuts and lift off the gear shift lever and control rods.

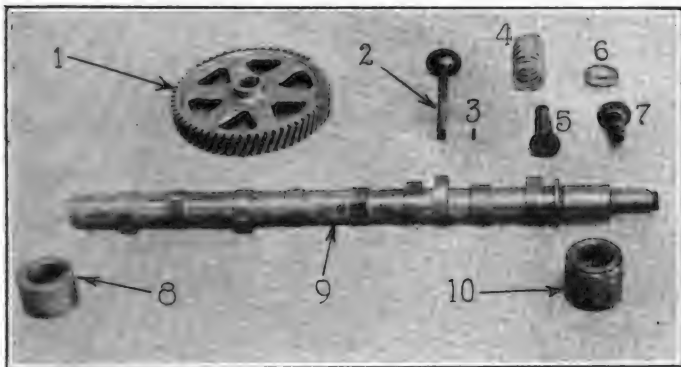
The engine and transmission gearset may be slipped forward and removed from the car, after the radiator has been removed. If the work is to be done by one person by the aid of a block and tackle, the tackle should be fastened back of the centre of the engine, as the weight of the transmission gearset will cause that end to drop unless the rope is near the centre of gravity of the power plant.

Disassembling Power Plant.

After the removal of the power plant from the car the first step in disassembling is to remove the transmission gearset hand hole plate and take off the three clutch spider nuts which hold the clutch springs against the clutch drum.

The cap screws which fasten the transmission bell housing to the supporting member are next removed, whereupon the gearset and housing may be removed from the engine, leaving the clutch spider on the supporting collar. The clutch spider with its ball bearing is retained by a spring ring which may be removed with a screw driver and a pair of pliers, and when this is done the bolts fastening the flywheel to the crankshaft are exposed.

The flywheel is fastened to the crankshaft by four bolts. When these are removed the flywheel may be pulled from the shaft. There should be absolutely no play between the bolts and the flywheel or crankshaft. It is essential that the fit be tight, or there will be a knock in the engine due to the running ahead or lagging of the flywheel at each explosion



Camshaft and Valve Parts: 1, Timing Gear; 2, Valve; 3, Valve Pin; 4, Valve Spring; 5, Push Rod; 6, Valve Spring Retainer; 7, Valve Stem Guide; 8, 10, Camshaft Bearings; 9, Camshaft.

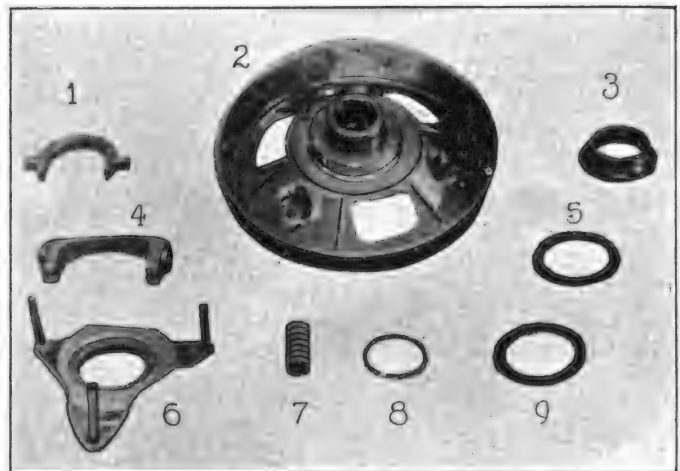
pin bushing should be driven out and replaced with new and, if necessary, a new wrist pin put in. The wrist pin is clamped into the connecting rod by a bolt, hence it is important that this bolt be screwed up tightly and be kept from turning by a cotter pin. If this is not done the wrist pin is apt to work loose and score the cylinder walls.

If there has been trouble with oil leakage or excessive carbonization, the installation of a set of leak-proof rings is often beneficial. In addition to this remedy the lower edges of the two ring grooves, one below and one above the wrist pin, may be beveled slightly and a number of 1/16 inch holes about one inch apart drilled at an angle of 45 degrees downward through to the inside of the piston. The beveled edge should be of just enough face to permit the centering of the drill easily. This beveling process applies to practically all of the cars on the market and is effectual to a great extent in that the oil is scraped into the bevel and forced downward at every upward stroke of the piston.

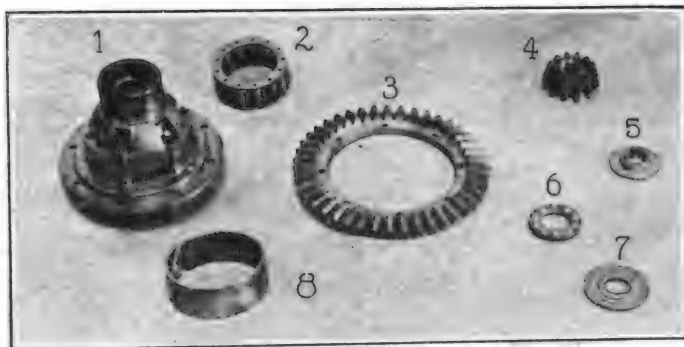
The cylinders should be examined in two respects; first, to see that there are no scratches or scores in the walls; second, to see that they are absolutely round. The diameters should be measured in a number of positions and should a variance be found the cylinders should be ground or bored round again. Bad scratches or deep scores may be filled, or the cylinders ground or bored.

Points in Engine Removal.

Before removing the engine from the car the magneto and



Clutch Components: 1, Clutch Shifter Yoke; 2, Clutch Cone; 3, Clutch Release Bearing Outer Race; 4, Clutch Shifter Fork; 5, Ball Ring with Balls; 6, Clutch Spider; 7, Clutch Spring; 8, Outer Race Retaining Ring; 9, Inner Race.



Differential Parts: 1, Differential Housing Assembled; 2, Roller Bearing; 3, Drive or Ring Gear; 4, Pinion Gear; 5, Differential Thrust Bearing Outer Race; 6, Thrust Bearing Retainer with Balls; 7, Inner Race; 8, Roller Bearing Outer Race.

stroke. If the bolts fit poorly, or if the holes are ragged and out of round, the holes should be reamed out and new bolts fitted to the holes.

With the flywheel removed the bolts holding the motor generator into place may be unscrewed and the coupling bolts taken out. The motor generator may then be taken from the engine.

Dismantling Operations.

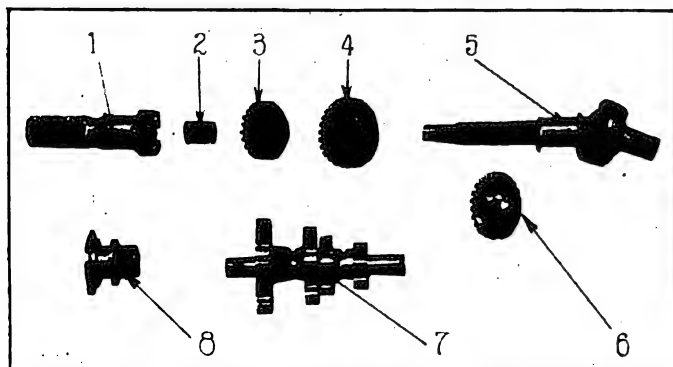
The engine may then be placed "on its head" to facilitate the rest of the dismantling. The flywheel housing, which is fastened to the engine by six screws, should be removed next, exposing the crankshaft bearing.

The generator pulley set screw should next be removed and the pulley drawn from the shaft, exposing the two bearing screws. When these screws are removed the generator drive shaft may be taken out. After the fan belt pulley, which is fastened to the magneto shaft by a set screw, has been removed the timing gear case screws should be taken out and the case removed.

The timing gear on the crankshaft is fitted with a set screw and a key. After the set screw has been removed the gear should be drawn from the shaft. The timing gear on the camshaft is held in place by a nut and a key; this gear should also be removed.

The crankshaft is supported upon two bearings, one at the front, the other at the rear. A careful examination should be made of the bearings and if there is any play they should be removed and replaced with new. The removal of the front bearing is accomplished by taking out the six timing gearcase screws and removing the case; the bearing may then be driven from the case. It is not necessary to disturb the front bearing unless it shows wear, since the rear bearing and crankshaft may be removed through the rear of the engine.

The rear bearing is fastened to the engine by the same screws that fasten the flywheel housing, previously removed, the crankshaft, together with the bearing, may be drawn out of the engine. Two bolts secure the bearing around the



Gearset Components: 1, Pocket Gear; 2, Pocket Gear Pilot Bearing; 3, High and Intermediate Sliding Gear; 4, Low and Reverse Sliding Gear; 5, Transmission Main Shaft and Universal Joint Assembly; 6, Reverse Idler Gear; 7, Countershaft and Gears Assembled; 8, Front Countershaft Bearing.

crankshaft and after these have been removed the bearing may be taken from the shaft.

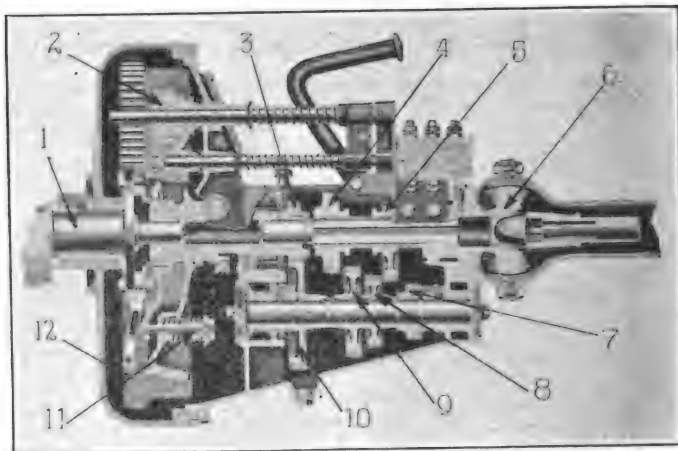
The camshaft is mounted on two bearings which are held into the engine block by set screws. After the set screws have been removed the bearings may be driven out and the camshaft removed.

Precautions in Reassembling.

When reassembling the engine the greatest of care must be taken that all of the screws are locked, either by lock washers or cotter pins, and set up absolutely tight. In seating the bearings the surfaces must be clean or the bearings will not line up. Bearings should be driven into place, using a piece of wood and hammer, or a lead hammer with a piece of lead or block of wood on the opposite side to take up the jar. Under no condition should the end of the crankshaft be hammered, for the result if the blow was sufficiently great would be a breakage in a short time. This statement is true regarding any automobile engine. Because of its peculiar construction and the number of acute bends, a jar at one end tends to snap the shaft at one of the acute angles.

Examining the Transmission.

The transmission is of the sliding gear type and the main shaft is in two sections supported at both front and rear by bearings. The front section, consisting of what is termed the pocket gear, is mounted in large roller bearings and supports the rear section upon roller bearings. Upon this pocket gear is mounted the cone clutch. After the gearset has been removed from the engine the clutch pedal shaft should be re-



Sectional View of Transmission Gearset Showing Location of Parts: 1, Crankshaft; 2, Starting Pinion; 3, Pocket Gear; 4, High and Intermediate Sliding Gear; 5, Low and Reverse Sliding Gear; 6, Universal Joint; 7, 8, 9, 10, Reverse, Low, Intermediate and Drive Countershaft Gears; 11, Clutch Spring; 12, Flywheel.

moved and the clutch shifter yoke and fork lifted from the case. The clutch drum may then be slipped from the pocket gear for necessary repairs.

The rear bearing of the gearset is held in place by a set screw. When this is removed the shaft, with the universal joint attached, may be driven from the case. Since the bearing is in two pieces it can be taken from the shaft after that member has been removed. The two sliding gears on the main shaft would be left in the case and these may be removed after the shaft has been taken out.

The pocket gear may be drawn into the transmission case and removed through the top. All of the countershaft gears are keyed to the shaft and this unit may be removed without disturbing the gears. Remove the bearing set screws and drive out the bearings. The countershaft then may be slipped back until the front of the shaft is released, and taken out of the case from the inside.

The reverse idler shaft is held in place with a set screw on the outside. When this set screw is removed the shaft may be slipped out, leaving the idler gear on the inside of the case.

It is a good idea to try all of the bearings on their respective shafts before replacement and in case of much wear

(Continued on Page 46.)



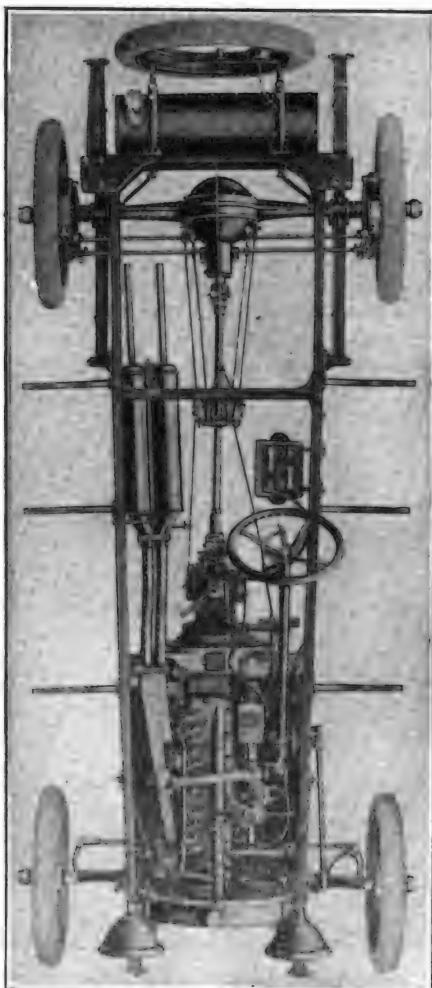
A Closed View of the Lexington Convertible Coupe; the Clubster; a Side View Showing One-Minute Storm Curtains on the Lexington Touring Car; an Enclosed View of the Lexington Minute Man Six Convertible Sedan.

THE Lexington-Howard Co. of Connersville, Ind., builders of the Lexington Minute Man Six, follows a special plan of assembly and manufacture which it explained in detail when the Lexington price was advanced to \$1345 in August. To their special manufacturing plan they attribute the high quality of their product, the overcoming of delays in assembly processes and the attainment of that unity which has at times been claimed to be lacking in an assembled car. Although the parts of the Lexington are not all made under one roof, they are made under one management.

The men at the head of the Lexington believe in specialization to produce a machine or unit with the greatest economy and efficiency, and in pursuance of this conviction they control a group of factories, each of which specializes in the manufacture of certain parts of the motor car. One factory makes nothing but springs, another turns out nothing but axles and another makes bodies and so on. While the factories are by no means superintended by the same man, they in reality constitute one huge plant. The management for all of them is the same, though each is operated by an expert in that particular line.

Under this manufacturing plan there is no delay in securing all the parts for the Lexington, making the finished automobile merely a matter of assembling. As each of the factories makes parts for a number of other makes of cars besides the Lexington, the full benefits of quantity production are realized.

For these reasons the Lexington makers argue that they are in a position to give more actual value in a car selling under \$1400 than mere figures imply.



Rugged Frame, Engine and Transmission, Forming Neat and Compact Chassis of the Lexington Six.

The engine is a Continental six-cylinder L head and generates a brake horsepower of 45 at 2250 revolutions per minute. With a bore of $3\frac{1}{4}$ and a stroke of $4\frac{1}{2}$ inches the engine is rated at 25.35 horsepower according to the S. A. E. rating.

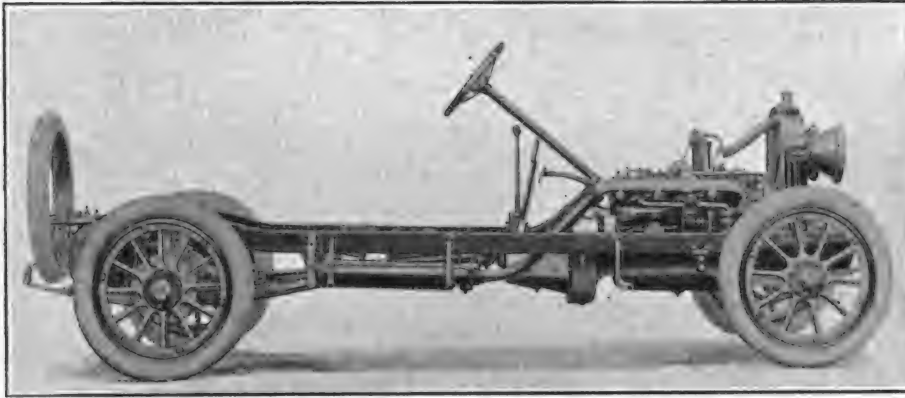
The cylinders and heads are cast in block with large water jacket spaces, insuring ample cooling under all conditions. The crankshaft is supported upon three bearings.

All of the valve mechanism is enclosed and accessible through hand hole plates in the side of the engine. The valves are $1\frac{3}{8}$ inches in diameter and lift $9\frac{3}{32}$ of an inch, insuring rapid intake and exhaust.

The Moore multiple exhaust system, of which a full mechanical description is given in the Automobile Journal of Jan. 25, is used. This device consists of two exhaust tubes and twin mufflers, which prevents more than one cylinder discharging into the same exhaust line at the same time. The manufacturers claim that with this system the engine will develop 22.8 per cent. more horsepower than when fitted with an old style single manifold, tube and muffler.

The oiling system is both force feed and splash, insuring perfect lubrication under all conditions. The oil reservoir being in the base of the engine.

Water is circulated through a large size radiator by a pump and cooled by a four-blade fan driven by a flat belt from the shaft. Fuel is supplied from a tank located at the rear of the car, through a vacuum feed to a Rayfield carburetor, mounted high on the engine. Air for the carburetor is heated by an exhaust fitting.



Side View of Chassis of the Lexington Minute Man Six.

The transmission gearset forms a unit with the engine and the unit power plant is supported upon the frame at three points. The gearset is of the sliding gear type, three speeds forward and one reverse. The clutch is of the dry disc type and mounted in the same housing with the power plant.

The rear axle is of the full floating type, with all drive and torque taken through the springs, which are three-quarter elliptic.

The wheels are 32x4 inches and fitted with Goodyear tires. The brakes, both service and emergency, act upon the rear wheel drums.

Control is at the centre, with the steering gear mounted on the left side of the car.

In addition to the many mechanical features that go to make satisfaction, there are several special body features. The touring car body is of the Salon type, with an aisleway between the front seats. Ample door space permits easy entrance or exit. The body lines are graceful and the sides high, giving an aristocratic appearance to the car. The Lexington Minute Man line includes a four-passenger club roadster and a convertible coupe, a five-passenger touring car top or convertible sedan.

TIRE-MAKERS ADVANCE PRICES

Automobile Shoes Mainly Affected by the Increase Due to the Higher Cost of Fabric

Seven of the leading automobile tire manufacturers have announced an advance in prices ranging from 5 to 15 per cent. The advance affects shoes mainly, as the cause of the increase is said to be due to the higher cost of fabric, while only rubber is used in tubes and that product is lower.

The Goodrich company has advanced casings 10 per cent. and a similar advance has been made by the United States, Diamond, Fisk, Ajax and Goodyear companies. The Firestone company has advanced the price of triple tread cord casings 10 per cent.; FF non-skids five per cent. and all fabric casings 10 per cent. The Goodyear company has also advanced the price of solids 15 per cent.

The other large tire companies have not announced any increase in prices as yet, but it is understood that the Miller Rubber Company will announce a higher price list on Sept. 15.

This is the third advance the tire manufacturers have put into effect within a year and has placed casings at a figure over 50 per cent. above where they were listed last December.

ELIMINATION OF ALL MUFFLER CUTOUTS URGED.

The National Automobile Chamber of Commerce has recommended the elim-

ination of all muffler cutouts on their cars.

The announcement was made following the meeting of the directors of the National Automobile Chamber of Commerce at which the Webb-Pomerene bill now before the Senate was indorsed. Hugh Chalmers, president of the Chalmers Motor Company, was elected first vice president of the organization to succeed W. C. Leland, and H. H. Rice, treasurer of the General Motors Company, was elected vice president of the gasoline division to succeed Mr. Chalmers.

NEW GASOLINE SUBSTITUTE IS BEING INVESTIGATED.

A new motor car fuel which can be used as a substitute for gasoline in the standard equipment on an automobile has been developed by Dr. Frazier L. Davis, 76 West Rutland square, Boston. Dr. Davis submitted his discovery to the Federal Bureau of Tests at Washington and Dr. S. W. Stratton of the bureau is conducting a series of experiments with the fuel and will announce the results in the near future.

The discoverer not only claims that his fuel is superior to gasoline, but that it can be produced for 12½ cents a gallon. It is a product resulting from a process of breaking up heavy hydrocarbons in kerosene oil, making it capable of complete volatilization in the ordinary carburetor with only slight adjustments. Following a test it was stated that the combustion of the fuel gave off no smell, the spark plugs were clean and there was no flying carbon in the wide open exhaust.

CAPT HOWARD MARMON RETURNS.

Capt. Howard Marmon, who has been visiting the aviation centres and factories in England, France and Italy to study aviation engines, has returned to Washington and taken up his work on the Aircraft Production Board.



The Power Plant of This Unique Tractor, Called an Auto-Horse, Which Will Draw a Load of from One to Five Tons, Is a Special Four-Cylinder Continental Engine, with Bore of 3¾ inches and Stroke of 5⅞ inches, the Horsepower (S. A. E. Formula) Being 22.5.



Model Daylight Factory for the Use of the Stewart Speedometer Corp., in Long Island City, the Borough of Queens, New York City, One of 42 Automobile Manufacturing, Assembling, Service and Accessory Plants in That Area.

Automobile Plants Ten Minutes From Broadway

More Than Forty of Them Developed Over the Bridge in Queensborough and Averaging Nearly \$1,000,000 a Year Each in Materials Produced

PERENNIAL interest in New York City, the worldfamed American metropolis, finds a new phase in the growth of the motor car industry within its very gates. This refers not only to New York City's prestige in the distribution of the motor car, but also to the toiling and service sides of the motor car industry. That there is a remarkable centre of motor car production and assembling in the heart of the area that spells itself Greater New York, is a novel fact that the average motorist is not inclined to grasp at its first assertion. This paper gives publication to the fact, established by an industrial survey of the Borough of Queens, that there is a marked centering of automobile industries in the Queensborough section of New York City, where today the survey shows there are 42 automobile manufacturing, assembling, service and accessory plants, credited in value of product in 1916 with \$37,448,000, and employing in that year nearly 9000 persons.

The local reasons for this centralization of the metropolitan automobile industry in the Queensborough section are entirely plain. In a nutshell the demand for room caused an overflow to where there was space to expand. As an interesting study of a great city's economic trend, as well as a faithful exposition of the expansion of the automobile business of the city and the nation at large, the Queensborough development stands unique.

From "The Row" to the Plants.

Nine-tenths of the sales of all classes

of automobiles in New York City are made from the salesrooms along what is known as "Automobile Row," being that portion of Broadway from 45th street to 66th street, Manhattan, of which Columbus Circle at 59th street can be said to be the centre. The millions of dollars in sales handled every year in the sales-

rooms of the 134 automobile companies which have salesrooms on Broadway, represents a bulk of stock, mechanical handling and service on the spot that everyone knows could no more be crammed into 134 metropolitan sales establishments than the crew of one first class United States battleship could be

ACCESSORY PLANTS IN QUEENS BOROUGH.

The parts and accessories plants in Queens Borough are shown in the following chart:

Company	Accessories	No. Emp.	Date Lo-cated
American Ever Ready Company.....	Batteries and electric equipment—flashlights	1600	1915
American Hard Rubber Company.....	Rubber Parts.....	1000	1884
Empire Art Metal Company.....	Tubing	850	1913
Brewster & Company.....	Bodies	800	1909
Humboldt Manufacturing Company....	Miscellaneous parts.....	90	1914
Piel Manufacturing Company.....	Horns and catorts.....	125	1911
Metal Stamping Company.....	Miscellaneous parts.....	250	1911
Stewart Company.....	Speedometers .....	..	1916
Goodyear Tire and Rubber Company...	Tires—Service	55	1915
Prest-O-Lite Company.....	Acetylene gas, storage bat.	20	1910
Auto Specialty and Equipment Co....	Auto hardware.....	4	1910
Fickling Enameling Company.....	Enameling bodies.....	60	1915
Moto-Meter Company	Motometers	40	1916
H. & N. Carburetor Company.....	Gas and kerosene carburetors ..	35	1916
Norma Company of America.....	Ball bearings.....	2	1916
Anthony Machine Company.....	Oil guns and pumps.....	24	1912
Walton Body Company.....	Bodies	2	1917
Plaza Auto Top Company.....	Tops	3	1916
C. A. Willey Company.....	Auto paint.....	75	1880
Fahnestock Electric Company.....	Electrical parts.....	14	1916
Seubert Bearing Company.....	Bearings	25	1915
Astoria Wire Company.....	Insulated wire.....	4	1913
Kates Machine Works.....	Valve tops.....	4	1909
Queensboro Brass and Bronze Co....	Castings	25	1903
Merrell Brothers.....	Drop forgings.....	100	1906
Akron Tire Company.....	Tire service.....	40	1913
Cobal Manufacturing Company.....	Electrolytic copper articles..	4	1916
United Specialties Company.....	Nickel plates.....	16	1915
Russell McGee Foundry Company.....	Castings	65	1913



American Ever Ready Works, Long Island City, Borough of Queens, N. Y.

crammed into 134 equally famous metropolitan hall bedrooms. Hence the logical result of an overflow of stock and service handling to a convenient suburb. Now 59th street runs directly over the East river via the Queensborough bridge into Queens, and it is only a five or 10-minute automobile run between any of the plants in Queens and the sales centre in Manhattan. This instance of direct, sound, urban development through the direct channels of motor traffic to the use of the motor industry is a triumph in itself for the motor vehicle. Statistics bear their testimony to the facts, for the records of the Bridge Department of New York show that for the year 1916 there were 3,525,000 vehicles crossing this bridge.

Due consideration is also called to the fact that the automobile sales centre in Manhattan is in effect that centre of automobile sales for the entire United States, as practically every motor car corporation in the country maintains its principal branch office at this point, and more automobiles are sold yearly in this district than in the combined automobile sales districts of any other five cities in the country. It is, without doubt, these favorable conditions for economical production and distribution that account for the establishment in Queensborough of 13 automobile manufacturing, assembling and service plants and 29 accessory and parts concerns.

Factories Going Up in Sales Territory.

"In 1916 an illogical condition existed in the automobile industry—that while only 6½ per cent. of the total number of motor vehicles produced were manufactured in the East, 32 per cent. of the total sales was made in the East, including those exported from the Atlantic ports," according to an article in the Automobile Number of 'Queensborough,' the monthly publication of the Chamber of Commerce of the Borough of Queens, New York City. But the most important factor in automobile construction," the paper continues, "is the assembling of some 280 different kinds of manufactured parts to make a complete car.

"In the gathering together of the parts needed for automobile construction, the manufacturer in the New York area has at his command the largest available supply of parts, materials and accessories. In this respect no other city in the country equals New York as an economic assembling point for automobile construction.

"A large number of these plants producing parts and materials used in automobile construction are located within the limits of the City of New York, and their products are available for quick and cheap delivery by motor drays.

West's Draft on Eastern Parts.

"To show how even the Middle West manufacturer is dependent to a considerable extent upon the eastern manufacturers of parts and materials the following list is given of some of the parts purchased in the East for the construction of a car manufactured in Indianapolis:

"Ball bearings from Bristol, Conn.

"Axles from Wilkes-Barre, Pa.
 "Springs from Wilkes-Barre, Pa.
 "Bronze parts from Berwyn, Pa.
 "Magneto from New York City.
 "Gears from Rochester, N. Y.
 "Differentials from Syracuse, N. Y.
 "Frames from Philadelphia, Pa.
 "Windshield from New Haven, Conn.
 "The purchasing agent of one of the large manufacturers in Queens Borough says that they can buy practically all of the materials they need in motor car construction from points of production east of the Alleghenies and that for their business New York is a cheaper assembling point for materials and parts than any other location in the country and subject to less delays in freight delivery.
 "The labor supply of Queens Borough is unlimited because within easy traveling distance there is a population of 8,000,000 from which to draw. This gives the manufacturers or service stations a variety and choice of labor that cannot be equaled anywhere."

General Vehicle Company.

Among the 13 general plants is that of the General Vehicle Company, which employs up to 1600 men and has a gross annual production valued at more than \$6,000,000. This plant produces the high class Mercedes truck and a complete line of G. V. electric commercial trucks.

This company started in Queens 12 years ago in a two-story building, 100x500 feet in dimension. They now have four additional buildings with a total floor space of 350,000 square feet.

In addition to the 100 trucks per month they manufacture high class airplane engines.

Brewster and Company.

Brewster and Company, whose name has been famous for years in the vehicle industry, have developed a pleasure automobile of high merit and occupy a large factory building on Queensboro Plaza, where they employ more than 800 men. They have developed the manufacture of



Building of Moto-Meter Co., Manufacturers of Motometers.



Harrolds Motor Car Co. (Pierce-Arrow), Service Station, Long Island City.

a passenger car and are extensive builders of high class automobile bodies.

Assembling Plants.

Large corporations whose main plants are in the Middle West, have found it of advantage to establish large assembling plants in Queens, to reduce to a minimum the cost of rail freight charges on completed automobiles. It is difficult to draw the line between one of these large assembling plants and an automobile manufacturing establishment, since automobile manufacturing anywhere is largely a matter of assembling of parts and finishing.

The Packard.

For example, the Packard Motor Car Company has occupied since 1909 a factory building in Queens Borough comprising 150,000 feet of floor space, and is just completing an addition to this building, affording them a total of 325,000 square feet. This is called an assembling and service plant and yet it employs 600 people, and when the new addition is completed this force will be doubled.

The Ford Factory.

The Ford Motor Car Company's assembling and service plant employs nearly 800 men in a nine-story building, containing nearly 1,000,000 square feet of floor space.

Forty thousand cars are turned out annually from this factory. This means 150 cars per day. The Ford factory in Queens was originally established in 1911, with three stories and a basement, but in 1913 it became necessary to add five additional stories to the original structure. During 1914-15 a further addition was made, which is about three times as large as the original eight-story building. This is one of the largest industrial plants in the Borough of Queens, and the largest building devoted to the use of the automobile industry in this section of New York City. Very few European motor car factories turn out as many cars in a year as does this assembling plant, which supplies only the territory controlled by the New York City branch of the Ford Motor Company.

Pierce-Arrow Plant.

The Pierce-Arrow plant of the Harrolds Motor Car Company in Queens em-



Merrill Bros. Works, Drop Forgings, Long Island City, N. Y.

loys nearly 300 workers. Their original plant included a floor space of over 10,000 square feet in a four-story factory costing approximately \$400,000. In 1916 the business of this company had increased to such an extent that additional land, 118x200 feet, was purchased by the company for the purpose of enlarging the present capacity.

The modern well equipped factory of this company is a fine addition to the many automobile plants now located in Queens Borough.

The Studebaker Corporation employs

more than 200 men in a big assembling and service plant, built especially for their needs, at the Degnon Terminal in Queens Borough. This company found their present location of such advantage that six months after opening, demands of business made it imperative for them to extend their factory accommodations.

The Simplex.

The Simplex, another high class pleasure automobile, has an important assembling and service station in Queens. They have added another story to their original building during this year.

Maxwell Plant.

The Maxwell Motor Corporation, who now operate a large service plant in Queens, are planning to erect an assembling plant in the same vicinity.

Renault, Delaunay and Rainier.

Renault Freres, Delaunay-Belleville, Rainier Motor Corporation and the Transport Tractor Company are automobile corporations operating plants of considerable size in Queens.

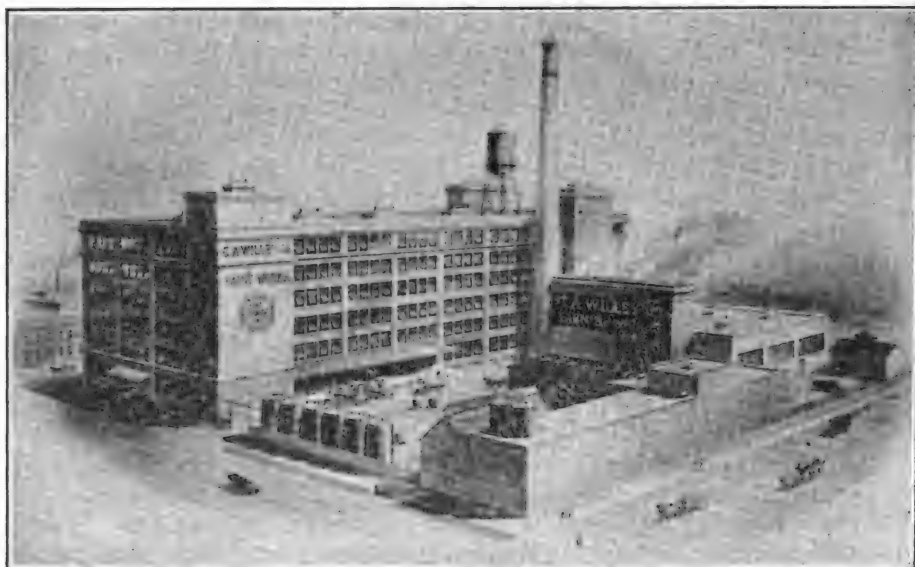
Rolls-Royce.

The Rolls-Royce Co., Ltd., of London, is the latest of the automobile assembling plants to locate in Queens. In May they purchased a plot 100x150 feet, upon which they will erect a four-story service station at a cost of \$100,000.

The Accessory Plants.

In addition to the 13 manufacturing, assembling or service plants in Borough of Queens, there are 29 important manufacturing plants devoted to the production of automobile parts and accessories and these plants employ more than 5000 workers. The products of these plants in 1916 were valued at \$13,488,000.

Some of the tire manufacturers have taken advantage of the facilities of Queens Borough by building up important service stations there. The Goodyear Tire and Rubber Company has realized the value of having a distributing point near the key of the eastern market, and in view of this has a \$400,000 structure on a 300x150 foot plot. The Akron Tire Company, located at Honeywell avenue and Skillman street, has a service plant in Queens.



C. A. Willey Co. Factories, Automobile Paint and Coach Colors, Established 1880.

PLATE VIII.

INEXPENSIVE WOODEN GARAGE FOR TWO CARS

Frame Building Walled With Novelty Siding and Entered Through Sixteen-Foot Doorway Equipped with Sliding Doors

Designed by the Architectural Department of the Automobile Journal Publishing Co.

IN THE preceding articles on garages the more elaborate types have been dealt with. The design this issue is of a less expensive type, the structure being of wood throughout and so simple in detail that the average man, handy with tools, could do most of the labor. As labor incurs about 60 per cent. of the cost of a building the saving that can be effected by doing some of the erecting work is considerable.

The garage is designed for a private estate, either to house the owner's two cars or to permit of renting space which will more than pay the builder interest on the investment. In describing its construction the detail can be best followed by starting with the foundations and working up. The foundation walls are 25 feet long, 20 feet wide and 10 inches thick extending below grade, three feet six inches with a footing 18 inches wide. An underpinning of brick, five courses eight inches thick, is laid on the foundation walls and adds greatly to the finish of the garage.

The concrete should be of a mixture of one part cement, two and one-half parts sand and five parts of screened gravel or crushed rock for the coarse aggregate. Before erecting the superstructure it is a good plan to finish the floor if cement is the material to be selected. The mains for any gas or water connections should be first installed and the hole for the pit dug, after which the ground within the foundation walls should be tamped down hard with a heavy pounder.

Two different mixtures are used in laying the floor, which should be at least five inches thick. The first layer, four inches, is made of one part of cement, $2\frac{1}{2}$ parts sand and five parts of crushed stone or coarse pebbles. The surfacing layer is placed before the first layer is set and is mixed of one part cement and two parts sand. A gentle inclination of the surface toward the drain in the centre aids in rapid drainage when washing the cars.

Where the location is such that it is either impossible or inconvenient to make sewer connections for the drain, a French drain may be constructed which will answer the purpose. A French drain is installed by burying a barrel filled with rubble beneath the drain inlet.

The frame of the building is erected on 4x6-inch sills of 2x5-inch studs, 12 feet long; 2x8-inch spruce rafters on 4x4-inch plates. The structure is walled in with novelty siding, which makes shingling or the use of clapboards unnecessary.

On the roof seven-eighths inch boarding is used with shingles.

A first grade cedar shingle is the best investment in the long run and should be laid not more than $4\frac{1}{2}$ inches to the weather. A four-inch lap is better and the shingles will give longer service. Galvanized nails only should be used in laying the thatch.

Roof drainage is provided for by a wooden built in gutta with a 3x4-inch wooden conductor.

A 16-foot doorway with two sliding doors affords ample entrance room for both sides of the garage and these doors are $2\frac{3}{4}$ inches thick. Two large windows are provided in the upper half of the doors and the same number are provided for in the plans on each end and for three in the rear directly over the work bench. These windows may be double hung or hinged as the owner prefers. A small door at the side in the rear is provided as a general entrance to avoid handling the larger doors when unnecessary.

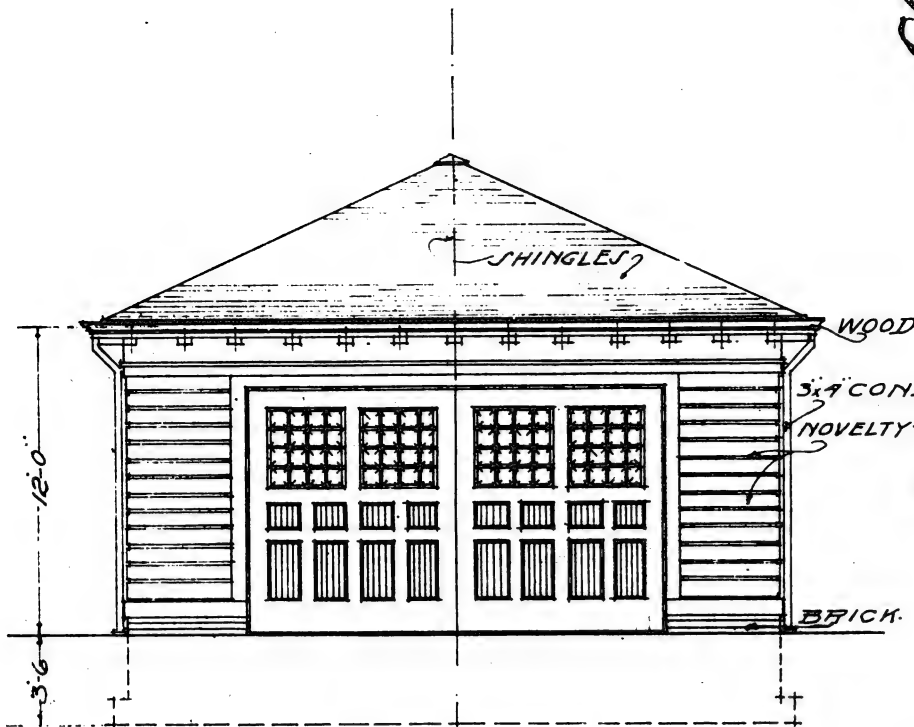
Working facilities are increased through the convenient location of closet, sink and work bench at the rear. One light is located directly over the bench and two others on the ceiling immediately above the centre of the car positions.

For heating, steam or hot water are preferable to the other methods, and can be used most advantageously when connected with systems in the home. The standard method of using wall pipes for carrying the water or steam gives efficient service, as it distributes the heat in the location where needed most. Connections with the house water supply should also be made when possible, as water is needed for many things in the garage. The trenches and conduits for carrying these pipes into the building should be laid out and constructed before the foundation and floor are constructed, otherwise the installation will call for considerable extra labor and restoration work.

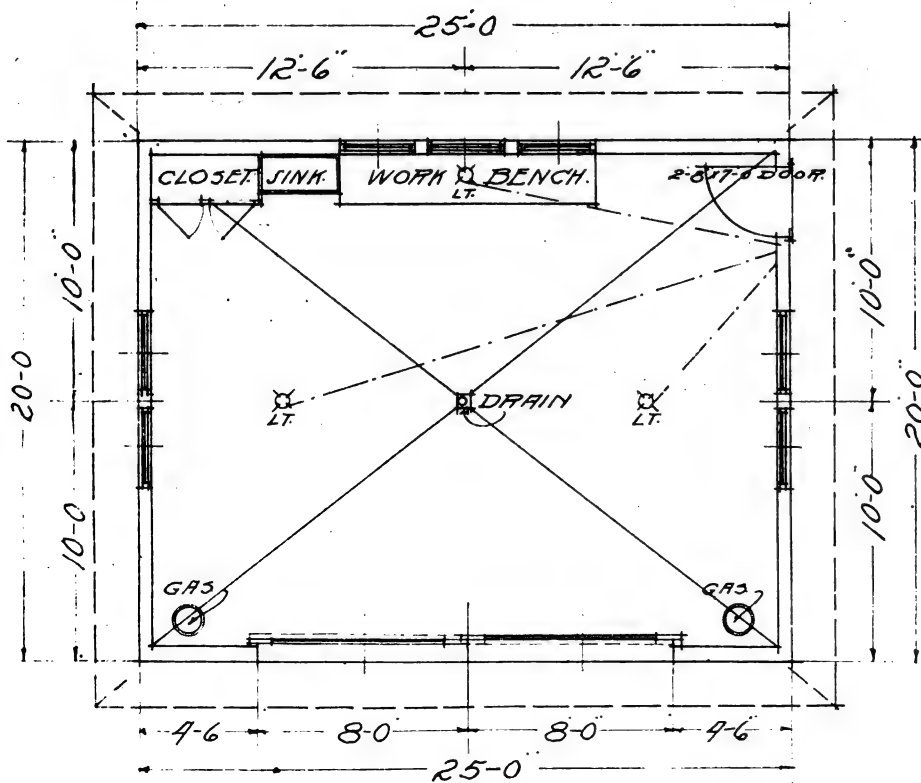
The ordinances in cities show quite a wide difference in regard to building regulations, line walls, etc., a fact which would require inquiries from the building inspectors in case the builder was not employing the services of a contractor, so as to be on the safe side.

The structure when completed is serviceable and can be so finished as to enhance the appearance and value of the average estate. Its cost would vary from \$350 to \$400 in accordance with the outlay for labor or materials.

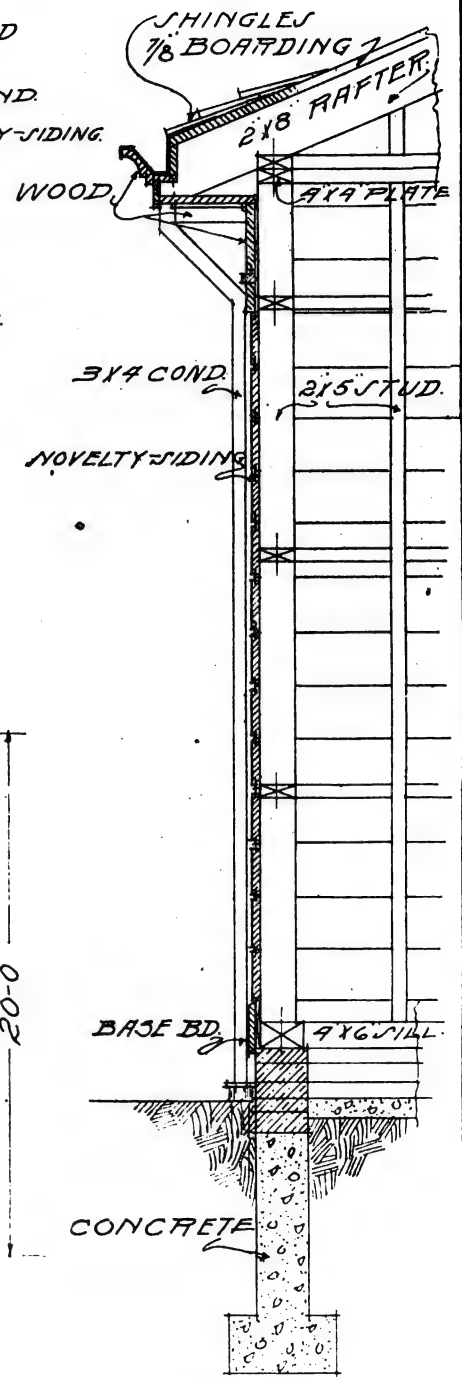
PLATE VIII



ELEVATION
SCALE



PLAN



SECTION
SCALE

FOOD PLEDGE

(From The Automobile Journal.)

TO THE UNITED STATES FOOD ADMINISTRATION, WASHINGTON, D. C.

I am glad to join you in the service of food conservation for our nation, and I hereby accept membership in the United States Food Administration, pledging myself to carry out the directions and advice of the Food Administrator in my home, in so far as my circumstances permit.

Name
 Street City
 State Occupation
 Number in household Occupation of breadwinner
 Will you take part in authorized neighborhood movements for food conservation?
 Have you a garden?

There are no fees or dues to be paid. The Food Administration wishes to have as members all of those actually handling food in the home. All women over 16 are eligible.

DIRECTIONS.

Mail your pledge card to the Food Administrator, Washington, D. C., and you will receive free your first instructions and a household tag to be hung in your window.

If you want the button of the Food Administration, send 10 cents and a return addressed envelope. The shield insignia for the sleeve of the uniform will be sent with the button if you ask for it.

National Old Trails Road and the Dixie Highway. An average of 200 miles a day is expected. The start was made Aug. 4 from Chicago in charge of Roy S. Marsh and Edward G. Lawrence. The object of the trip is road observation for the highway associations, reporting the conditions of roads for touring traffic. On being reported as reaching Cheyenne, Wyo., the car continued westward along the Lincoln Highway to San Francisco.

COMMERCE BUREAU WANTS TRADE CATALOGUES.

The Bureau of Foreign and Domestic Commerce is making a collection of trade catalogues published in the United States and in foreign countries and the collection will include those of aeroplane, automobile, truck, motorcycle, parts and accessories, manufacturers and makers of all kinds of vehicles, India rubber, gutta-percha, implements, tools, machinery, engines, oils, etc.

The catalogues should be sent to the "Bureau of Foreign and Domestic Commerce, Research Section." Bound catalogues are desired, or at least the more substantial unbound catalogues. Casual catalogues, folders, circulars and similar publicity matter are not wanted. It is especially requested that catalogues issued in the foreign languages by American concerns be supplied, and when new editions are issued the latest copy should be sent to the bureau so that the collection may be kept up to date from year to year.

WAR BREAD.

One of the large New York hotels is baking and serving on its tables a variety of war bread made from a mixture of rye and wheat flour. This bread is listed on the bill of fare as "Old Glory War Bread," with the name of the hotel. The chef claims that it will keep a week or more without getting stale, that it improves with age and is best several days after baking. The hotel encourages its consumption by a patriotic appeal on the bill of fare.

RIGHT OF WAY FOR THE BROILERS

How Motorists Can Spare Annually \$210,000
 Worth of Chickens That Dispute the Road

DURING this time of national conservation it is well to consider the little things. It may seem comical on the face of it to call motorists' attention to one phase of conservation that every automobile owner can participate in, but considered from a serious standpoint, this hint or advice is of paramount importance, according to B. W. Twyman, general manager of the Inter-State Motor Company.

Roughly estimated there are over 3,000,000 cars in daily use in this country. Nearly every one of these cars covers some part of a country road during each touring season.

In the past there has been much said by the farmer about the destruction of chickens that occurs each year, and the average remarks of the farmer have been anything but complimentary.

It would be impossible to gather statistics on the total number of chickens that give up their lives each year because some motorists are careless, but for the sake of argument, suppose one-fifth of the cars in this country, or 600,000, were responsible for the death of as many good live barnyard fowls. This may be a high rate, but it will serve to bring out the point.

Now good chickens are retailing on an average of 35 cents per pound, and if each of the chickens killed only weighed one pound, the total value of the chickens destroyed would be \$210,000.

A little figuring along this line will go to show that it is the duty of every motorist to be as careful on the road as possible. Of course the motorist is not wholly to blame, as the farmer must do his duty by obeying the law and keep his chickens off the highways. But at the same time the hen is a peculiar ani-

mal, and most farmers are having about all they can do to properly harvest and solve the bigger issues of farm work.

If you are driving in the country remember that you can "do your bit" by making it a point to slow down, or stop if necessary, in order to avoid spoiling for the market some good business like hen, who not only has a high face value, but right now is a very important adjunct to our military scheme of things.

ELGIN ROAD SCOUT CAR SPEEDING IN THE FAR WEST.

The Elgin "Six" National All Trails Scout car set out first through the Far West on a 12,000-mile jaunt which will carry it over the Lincoln Highway, the

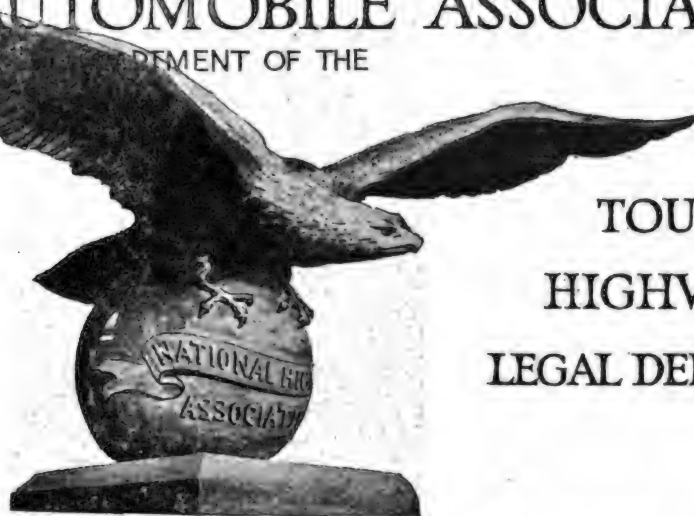


Road Observation Party in Elgin Six Circles the Pacific Slope on Noted Highways Making an Average of 200 Miles a Day.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION



TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

Conflicting Lighting Laws Call for Uniform Law

THERE is an urgent need for a uniform law relating to the headlights on automobiles, a law which shall be the same in every state, wisely says the New Haven Register, which shall clearly define conditions under which lights must be lighted, how far they shall illuminate when lighted and to what height above the ground the light shall extend. At present the various state laws are a medley of rules and regulations, and dealers shipping automobiles to various parts of the country are put to a great deal of trouble to see that the cars are equipped according to the laws of the state in which they are to be used.

A good beginning for the enactment of national laws to govern the entire problem of the motor vehicle might be made with the lighting regulations. The time is coming when such laws must be enacted, not only for the protection of the public, but for the protection of the automobile owner. There should be a set of laws which would make uniform conditions for driving, speed and lighting in every state in the Union, but it is admitted that the time is not ripe for such enactment at present. A fine opportunity for the trial of such national legislation is given in the chance to work out some law for uniform lighting.

Investigators have found that nearly all the states have tried to prevent the temporary blinding of an approaching driver and have specified the use of "dimmers."

The following states now require that the beam of reflected light from front lamps shall not rise more than 42 inches above the level surface of the road on which the vehicle stands, unless the lamps are fitted with lenses or dimming devices to diffuse rays or lessen the in-

tensity of the light: California, Connecticut, Florida, Iowa, Nebraska, New York, Nevada, North Carolina, North Dakota, Ohio, Oregon, Texas, Utah, Vermont and Washington.

Other states prescribe dimmers that must not reduce the volume of light so greatly that the lights cannot be seen from a distance varying from 200 and 500 feet ahead. Some states prescribe white headlights, others permit the use of colored glass. Today, to comply with all the state laws, the driver of a car

must have lamps which will prevent throwing a dazzling beam of light more than 42 inches above the surface of the road 75 feet ahead of the car, yet which will not prevent them from being visible 500 feet ahead or giving sufficient white light 250 feet ahead and 10 feet each side of the road 10 feet ahead of the car. Even then he may run afoul of some city or town ordinance. The time is coming when the problem of regulating the automobile must be taken up by the federal government.

Trying Reciprocal Law Enforcement

Connecticut and Massachusetts Make an Agreement to Punish Reckless Motorists

COMMISSIONER of Motor Vehicles Robbins B. Stoeckel has entered into a reciprocal agreement with the state highway department of Massachusetts whereby a resident of either state who violates the automobile laws of the other can be called back for a hearing in the state where the violation took place. In case the person does not attend the hearing his driving license will be taken away by the commissioner of his own state.

Commissioner Stoeckel was the originator of this agreement and is making arrangements to have the agreement hold for all the New England states, as well as New York and New Jersey.

Commissioner Stoeckel stated that this agreement is aimed to eliminate reckless driving by out of state motorists. The commissioner will make an auto tour and

arrange conferences with the automobile commissioners of the other New England states, explaining the agreement and making arrangements to have it reciprocal for all the states.

CONNECTICUT.

MYSTIC. Automobile drivers on the Groton side of Mystic are being taught to obey the state laws through the persistent work of Patrolman Parker and a great change can be seen in the way machines are being handled. Mr. Parker is only on night duty, but is usually on Main street several hours during the days and keep his eyes open for violators.

MERIDEN. A new traffic order of the police department which the jitney drivers may think works a hardship on them, is the exclusion of all public service cars on East Main street from Colony street to the railroad grade crossing.

Police Activities

OUR reports from various points in New England are condensed herewith.

RHODE ISLAND.

WESTERLY-WATCH HILL. Motorists should not forget that it is illegal to pass trolley cars when stopped and taking on or discharging passengers. Arrests are being made.

NEWPORT. Motorists should slow down and sound their horns at intersecting ways, as the police are prosecuting violators of the law.

PROVIDENCE. Traps in East Providence, one between Red Bridge and Six Corners, at Waterman street, near Bay View College, are being operated; also on North Main street in Providence. Many arrests have been made and many are likely to follow unless motorists drive reasonably and carefully.

PAWTUCKET. The police of this city are enforcing the 15-mile speed limit on Main street and also on Broadway and West avenue.

RIVERSIDE. Traps have been set in Pawtucket avenue and on Bullock's Point and arrests are being made.

CONNECTICUT.

NEW HAVEN. Between Kimberly and Howard avenues a trap is being operated by officers in civilian dress. The officers are mounted on motorcycles.

HARTFORD. Many arrests have been made and heavy fines imposed upon motorists violating the speed law on Farmington avenue.

MASSACHUSETTS.

MARBLEHEAD. Silent policemen have been stationed at the junction of Atlantic avenue and Ocean streets at Gilbert's corner to warn motorists to be careful of this dangerous place and it will be well for motorists to govern themselves according to instructions upon them.

SOUTHBRIDGE. Much complaint is being made about the wild driving of autoists along Worcester street from Charlton street to the Charlton-Southbridge line.

FALL RIVER-ASSONET. Many of motorists arrests are being made in Assonet for violations of the motor vehicle laws.

SPRINGFIELD. While there has been marked improvement owing to the many arrests of motorists for violations of the eight-foot law in passing stopped street cars, there is still considerable violation and we warn all motorists to bear this state wide law in mind while violations are being prosecuted by any municipality or not.

READING. On the Andover turnpike. About 1½ miles beyond this town a trap is being operated. The police are using a Ford car to trail violators.

NORWOOD. Near by the Norfolk hospital a trap is being operated by the police. The trap is on a hill and a motorcycle officer is stationed there.

IPSWICH. The police of this town are arresting motor speeding motorists on county road and at Wind Mill Hill.

Traps



SOUTH HADLEY. A trip one-eighth mile long is being operated on the South Hadley Centre road by town and state officers.

SANDWICH. The police are endeavoring to force motorists to drive not faster than eight miles an hour through this town.

QUINCY. The police have been ordered to stop all speeding on automobiles to and from Quincy Point to city proper.

PLYMOUTH. Traps to catch over speeding motorists are being operated by the police of this town.

METROPOLITAN PARKWAYS. The metropolitan police on Blue Hill Parkway, Revere Beach boulevard and other parkways are making many arrests of motorists for overspeeding, failing to slow down and give a timely signal and for dazzling headlights.

MASSACHUSETTS. Many arrests are being made by local police and inspectors of the highway commission for failure to properly dim headlights on automobiles. We would suggest that motorists should at once attempt to comply with the law.

RHODE ISLAND.

PROVIDENCE. Traffic violators are meeting with considerable difficulty in evading the law these days, with officers, in uniform on the watch for them at both Division and Main streets at the Four Corners near the sea. View station. Particularly are violators curbed at Division and Main streets, where the need has long been felt for a traffic officer.

MASSACHUSETTS.

WORCESTER. (Shrewsbury street.) Worcester's noted speedway is going to be made safe. Automobile and horse drawn vehicle traffic bound in the general direction of Lincoln Park, Boston, and points east, is to be shunted to the south side of the boulevard, while the Worcester bound traffic is to monopolize

Traffic Rules

the other side. A petition for such revision will soon be placed before the council committee on streets. At present autoists are using the north side of Shrewsbury street, traveling in both directions, while the horse drawn vehicles trot up and down the opposite side.

MELROSE. Both the mayor and chief of police of Melrose are making earnest efforts to lessen the automobile accidents in this city. A circular bearing the signature of these officials have been issued addressed to the automobile owners of that city. It reads as follows:

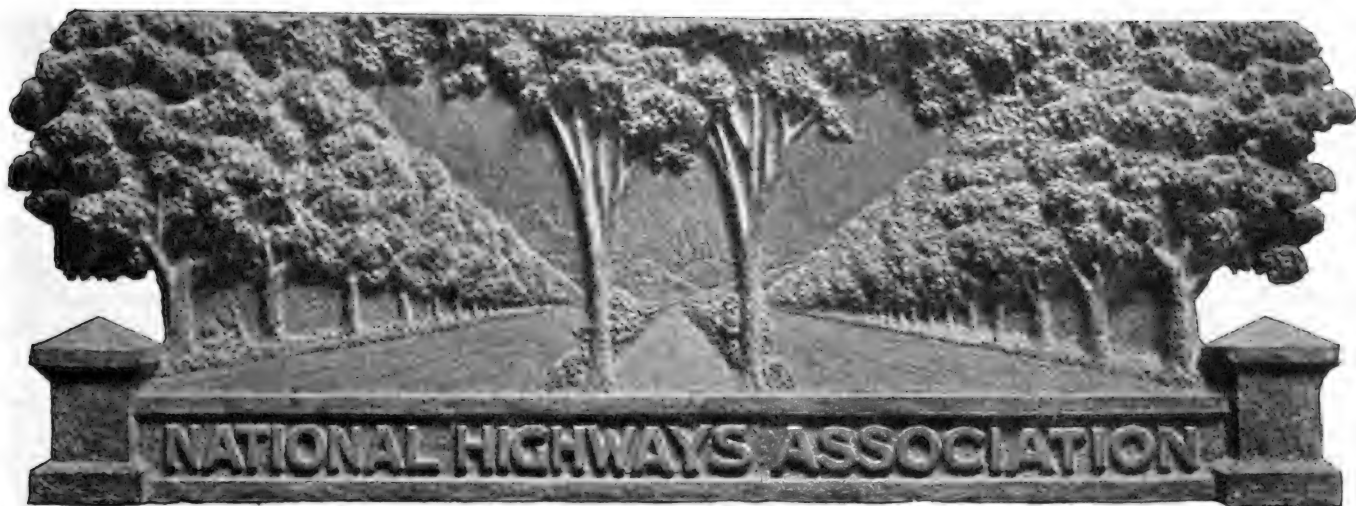
"The city is making an earnest effort to prevent automobile accidents and to save our people from injury. We cannot at present increase the police force and I am asking all Melrose automobilists to help in this work, by cordial acceptance of all regulations, by willingly being inconvenienced by sustaining the officials and by creating a public sentiment in favor of more careful driving and higher regard for safety in the streets.

"It is impossible to accomplish much without the support of those who own and operate cars in this city. This appeal is made in behalf of our own people for whose safety some of us feel deeply responsible. Accidents fall heaviest upon those who have no part in their cause. It is an awful thing to bear the blame for a life long injury to someone else. In this city of law abiding people we ask everyone who drives a car to make every effort to make our streets safe."

BROCKTON. City Marshal Herbert Boyden has issued orders that hereafter automobilists operating at speed of 25 miles an hour or more be summoned into court whether the excessive speed is on Main street, West Elm street or Warren avenue.

GLOUCESTER. New speed limits. Every person operating a motor vehicle on any way in this city shall run it at a rate of speed at no time greater than is reasonable and proper, having regard to traffic and the use of the way and the safety of the public. It shall be prima facie evidence of a rate of speed greater than is reasonable and proper as aforesaid if a motor vehicle is operated on any way outside of the thickly settled or business part of the city at a rate of speed exceeding 20 miles an hour for the distance of a quarter of a mile.

It shall be prima facie evidence of a rate of speed greater than is reasonable and proper as aforesaid, if a motor vehicle is operated on any way inside the thickly settled or business part of the city at a rate of speed exceeding 15 miles an hour for the distance of one-eighth of a mile; or if a motor vehicle is operated on any one way at a rate of speed exceeding eight miles an hour where the operator's or chauffeur's view of the road traffic is obstructed either upon approaching an intersecting way or in traversing a crossing or intersection of ways or in going around a corner or a curb in a street or way.



Conditions of Highways Throughout New England

Association Bulletin for the Information of Fall Tourists

FROM the association's information reports we present the following:

MAINE.

The roads are in a poor condition, being sandy and rocky from Portland to Danville Junction via Gray.

Except for a long bad detour, extending from Burnham for a distance of 10 miles, the roads are good from Waterville to Pittsfield.

From Waterville to Augusta via Vassalboro the road is hilly and full of ruts.

From Bangor to Pittsfield the roads are in good condition.

From Bangor to Bar Harbor the road is good except at Ellsworth Falls.

Motorists touring from Portland to Bar Harbor or Calais should travel via Bangor and Ellsworth, as the road is in very poor condition between East Orland and West Ellsworth for a stretch of about 10 miles. No advantage is gained by taking the so-called "short cut" via Prospect ferry at Bucksport over Prospect mountain.

From Brunswick to South Harpswell and Damariscotta to Penniquid Point the roads are fair, with some stretches of good sand and gravel.

The road is good from Milo to Mattawamkeag via Howland and Pleasant river, as are also the highways from Dover to Milo, and from Dexter to Dover and Foxcroft.

The road is very poor from North Edgecomb to Damariscotta, and from Damariscotta to Glendon the road is under construction and impassable. There are two detours to Nobleboro and it is suggested that the better one is via Damariscotta mills by turning to the left at New Castle.

From Portland to Bretton Woods the road is rather rough, while from Portland to Poland Springs there are many washouts due to the recent heavy rains. Between Poland Springs and the New Hampshire line the road is in fair condition for a dirt road.

From Portland to Portsmouth the road is not only new, but in very good condition.

From Augusta to Colebrook, N. H., the road is in rather poor condition.

There is mostly good county road from Dixfield to Grafton Notch and Upton, as well as from Dixfield to Augusta.

Between Livermore Falls and Augusta the road is in good condition. It is rough and sandy but between Dixfield and Livermore.

Between Poland Springs and Bethel the roads are good, except for a few miles before reaching Norway.

There will soon be a good state road between Bethel and Norway via Bryant's pond and Locke's mills.

From Gorham to Bethel the road is in good condition.

It is reported that the better road from Portland to Augusta is via Gray, Danville Junction, Auburn and Lewiston.

Between Bowdoinham and Richmond, on the Augusta-Portland road, there is a stretch of clay road which after a rain is almost impassable.

The road is good between Augusta and Rockland except for a few miles between the National Soldiers' Home and Windsor corner. This is the routing: Augusta, National Soldiers' Home, Windsor corner, Cooper's mills, Jefferson, Waldoboro, Tomaston, Rockland.

NEW HAMPSHIRE.

From North Conway to Colebrook the road is in good condition.

Through Crawford Notch the road is rough and it is also rough between Twin Mountain house and Echo lake.

Between Errol and Upton, near Lake Umbagog, the road is in very poor condition, being muddy and full of ruts.

CONNECTICUT.

The road between Hartford and Willimantic, for the major portion, is in good condition.

The road between Hartford and New

Haven via Meridan is now open to travel and is in good condition.

The road between Forestville and Plainville is under repair.

Between Stamford and Bedford on the Long Ridge road, so-called, the road is being reconstructed, but no detour is necessary.

The road between Milford and Stratford is under repair and a good detour has been provided around the uncompleted section of the highway.

Shelton street. Repairing is going on on Howe avenue and Clifton avenue between Derby and Ansonia.

On account of road construction on Derby avenue, between Derby and New Haven, a long detour has been provided.

The road between Winsted and Torrington is now open for travel.

The work on the Watertown road running north from Waterbury is nearing completion. No detour is necessary.

At Branford, on the Post road between New Haven and Saybrook, a bridge is being constructed. No detour is necessary.

The road is blocked between Naugatuck and Waterbury. Detour to the west by way of Middlebury.

RHODE ISLAND.

The road between Providence and New London via Naragansett Pier is in splendid condition there being but one short good detour at Wakefield.

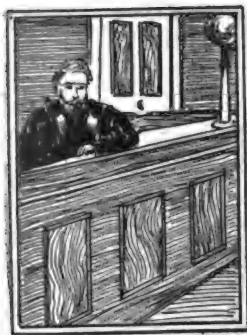
Between Providence and Worcester the road is in very poor condition there being a five-mile detour in bad condition.

Run via Centerdale, Greenville, Harmony, Chepachet, Thompson, Webster, Oxford to Worcester.

Waterman avenue, between Six corners and Red Bridge hill in Providence is now being reconstructed.

Broadway between Grove avenue and Broadway Six corners is now in splendid condition.

The new state highway between Naragansett Pier to Dale Carlla corner in Wakefield is now completed.



New York's New Motor Laws

Explained by

Secretary of State Hugo



MOTORISTS in New York who have felt that the licensing act was simply a revenue producing measure will be interested in the following statement from Francis M. Hugo, secretary of state:

"The most radical step forward which New York has yet taken in the control of its motorists is to be found in the Cromwell-Kelly law providing for the licensing of operators. All persons who operate automobiles in New York city for more than 10 days in the calendar year are required to register with the secretary of state and pay a fee of \$1. Chauffeurs are licensed as heretofore. The minimum age limit for all licenses is placed at 18 years. Operator's licenses are required for all out-of-town drivers whose stay in New York lasts longer than 10 days. The practical effect of the new law is to require all of the owners of cars in New York City, as well as the members of their families over 18 years who sit at the wheel of the family car to be registered.

"A person may be summoned, upon 10 days notice, given a hearing and his license revoked for any physical or mental disability which renders him an unfit driver, for gross negligence in the operation of a car whereby a person or property is injured, and where he shows a reckless disregard for the life or property of others.

Headlight Law's Provisions.

The new headlight requirement which puzzled a great many motorists at first are now understood by the majority of motorists, although a few drivers are somewhat confused and for their benefit Mr. Hugo writes:

No particular anti-glaring devices are to be officially approved by the state. The law confers no such authority on department or person. To comply with the new statute, however, automobile lights must meet the following requirements:

1. The beam of the reflected light shall not rise above 42 inches from the road bed at 75 feet ahead of the car.

2. The light from the lamp must be visible not less than 200 feet in the direction from which the motor vehicle is proceeding, and shall be of sufficient intensity to reveal objects straight ahead for not less than 260 feet.

3. The front lights must give sufficient side illumination to reveal objects 10 feet to both sides of the car at a point 10 feet ahead of the lamp.

4. Any auxiliary light or protecting

device (spotlight) is subject to the restrictions in regard to the beam. The beam of light is construed as meaning the approximately parallel focalized rays gathered and projected by a reflector, lens or other device.

Particular attention should be paid to ascertaining if the beam of the light rises above the prescribed 42 inches. On this largely depends the elimination of that dangerous glare that has forced many a driver into some roadside ditch.

NEW YORK STATE.

LE ROY. Automobilists passing through Le Roy, as well as the motorists of the village, will from now on be impelled to obey the traffic ordinances or be invited to visit the police justice and settle. The village trustees are to hire a special traffic officer whose entire duty it will be to enforce the law. The aldermen recently purchased a motorcycle fully equipped and the special officer will be mounted upon the machine.

WAVERLY. Waverly motorists are interested in the announcement that Owego village authorities are determined to enforce the new uniform traffic rules and regulations in that place. A short stay in enforcement was granted while George Shays, president of the Owego Automobile Club, has prepared signs warning motorists of the new provisions.

DUNKIRK. An ordinance to regulate speed and operation of electrically propelled trains and cars and of automobiles through and across certain highways within the corporate limits of the city of Dunkirk, N. Y.

The Common Council of the city of Dunkirk does hereby enact as follows:

Section 1. Every person or corporation operating or having control of the operation of an electric car or train running upon and along Railroad avenue, Doughty street, Lion street, East Fourth street and Central avenue to the City of Dunkirk, shall operate and propel such cars or trains in a careful and prudent manner and shall not operate and propel such cars or trains upon and along any of the aforementioned highways at a speed in excess of 12 miles per hour.

Section 2. Every person or corporation operating or having the control of the operation of an electric car or train running upon and along any of the highways mentioned in section one, shall not operate or propel such cars or trains across any street or highway intersecting the five aforementioned streets at a speed in excess of five miles per hour while such cars or trains are crossing said intersections.

Section 3. Every person or corporation

operating or having control of the operation of an electric car or train running upon and along Doughty street in said City of Dunkirk, shall cause every car or train running upon, along or through said street, to come to a complete stop in Doughty street prior to crossing the intersection of said Doughty street with Lincoln avenue, in said city, shall before said car is crossing said intersection.

Section 4. Every person operating any vehicle in the City of Dunkirk shall not cross Doughty street while proceeding in either direction upon Lincoln avenue at a speed in excess of five miles per hour.

Section 5. Every violation or the provisions of this ordinance shall be a misdemeanor, punishable as such.

LEGAL CONSTRUCTION OF NEW YORK AUTO LAW.

Many important phases of new laws in effect during the touring season are clearly defined by a statement from Melvin T. Bender, general counsel of the New York State Automobile Association, for the benefit of the members of the association and the motoring public as follows:

First—Amber headlights are not a violation of the law. This opinion of Mr. Bender's has been confirmed by Public Safety Commissioner Frost of Albany and instructions in accordance with these opinions have been issued to the Albany police.

Second—Signals need be sounded only at street intersections where the view of the driver is obstructed is the decision rendered by Justice Brady in Albany police court.

Third—Justice Brady has also decided that a first violation of the new traffic act is a misdemeanor and that police courts have jurisdiction in such cases notwithstanding the fact that the law does not specifically so state.

The question as to whether or not the uniform traffic law has eliminated speed ordinances outside of cities of the first class is now pending on appeal in Rensselaer county in the Fitzgerald case.

NEW JERSEY'S LAWS.

New Jersey requires white lights on its cars and has declined to approve certain type of lenses in colors on the ground that it is impossible to distinguish between a light pointing out a dangerous street intersection or a grade crossing from those of an automobile.

New Jersey's Light Law.

The anti-glare headlight law is being strictly enforced in this state. State inspectors are patrolling the highways warning motorists who fail to obey the law with respect to having dimmers on their headlights.

Fashions for the Autumn Motor Girl

Advance Modes Show Ultra Smart Styles in Coats and Suits for Fall and Winter Wear

By MRS. A. SHERMAN HITCHCOCK.



Motor Coats for Fall are of new and attractive design, material and trimmings. This smart "Palmer" model is of brown velour, trimmed with keramie. The style of back is entirely new, showing the advance mode for the season. The new sailor of satin, trimmed with folds and a small tailored bow of the material, is both appropriate and comfortable for wear in the car.



Motoring Neckpiece—All other styles may change, but the tailor made goes on forever, and with it one of the most important features is the neckpiece. This is one of the newest Timothy Crowley designs, made of Moonglo meteor and net. The particularly new line is introduced in the side point with the frill facing the opposite way. This style of dressing is particularly fetching for the woman who drives her own car.



The Motor Woman may appear excellently well dressed this fall if she wears a "Palmer" suit of this character. It is of taupe broadcloth, lined with peau de cygne and trimmed with mole. The skirt is made with draped effect and yoke at sides. Broadcloth is to be one of the modish materials for both motor coats and suits during the autumn season.

AS THE turn in the season comes the fair motorist—trim, active and shapely, with her hands on the wheel, cheeks glowing and eyes bright—is the queen of the season, "The Autumn Motor Girl." The seashore is deserted, forsaken by the eager, pleasure seeking lovers of the car for the autumn tour through the Berkshires, where nature is staining the vivid green with gaudy splashes of gold and scarlet, or through the cathedral woods of New Hampshire, where, lured by the wine of the forest, the blood leaps in the veins, and life is keyed to the highest pitch of wholesome enjoyment and flushed with the ecstasy of autumn. At Lenox, the modern goddesses of the motor car, clad in their new fall toggery, are enjoying to the utmost the exhilarating drives around the hill country, and there is never a time when society is more truly happy than when motoring. Each year society folk more eagerly and freely surrender themselves to the seductive fascination which motoring has. The lure of the motor is in the blood and little heed is taken of aught

else. Motoring knows no aftermath of ennui to the pleasure sated social set and the favored ones of fortune banish the thoughts of approaching winter with the stuffy, crowded ball rooms, the conventional afternoon teas and dinners, and are making the most of the lovely autumn season. The tan of the seashore has given way to the rosy glow painted on fair cheeks by the keen mountain winds which come down from the summits of stately hills for forbidden but delightful caresses. The hills and the valley echo and re-echo with the honk of the motor horn or the shrill treble of the siren. The contented purr of the motor is as music to the tourist.

The airs of the hill countries at this time of year are crisp and keen and the motoring clothing which did service earlier are comfortless things on a cool fall day, and unless enough has been provided for such emergencies when the summer campaign was planned out, some supplementary items must be added for immediate use; but for other wearing apparel of the motor outfit of winter the conservative woman waits until October,

One of the Imperial Motor Weave Robes, which come to match the color or upholstery of any car.



Artistic, Becoming and Lovely is this stunning suit. Wool jersey and moon-glo satin have claimed a relationship for the coming season and are appearing in combinations of every description. In this creation the moon-glo satin and jersey are both of tan color. Wool embroidery in shades of brown and tan are extremely effective and are well launched as being ultra smart for the fall and winter.

when the modes have become really settled and can be depended upon as perfectly correct. For autumn touring, which lasts all through October and sometimes well into November, the woman must have suitable clothing. Garments that will stand hard usage will be in every way comfortable and also absolutely adapted to motoring requirements.

The first requirement is, of course, that the garments shall be practical. Some women regard the pose of utter indifference to appearance as admirably sportsmanlike, but it is as absurd as it is unnecessary. No matter where the trip is to be made there is no excuse for a motorist to look her worst, and it should be her aim to look as well as possible, which is very well indeed with the many smart and attractive garments entirely appropriate for wear in the motor.

Garments Carefully Planned.

Any old coat and any old hat with some passe skirt and blouse seems to be the idea of some women making a fall tour, but the woman correct in good taste will have her coat and hat and frock planned as carefully as a dinner gown or a casino toilette. All of which truism is suggested by the motoring outfit of an experienced tourist who has done much touring in England and France and has developed a great love for autumn motor trips which take her into the Maine woods and through the Canadian forests

every fall. Her suit this season, made expressly for her trip by an exclusive tailor, consists of a short skirt and long, loose, beltless coat of Worumbo Nanken, which is an all wool material light of weight yet very warm. It is of the smart new aqua tone, which gives the effect of warm leaf brown, much like the prevailing hues of autumn woods. The skirt is six inches from the ground, and with this is worn high brown suede boots. The skirt is perfectly plain, a straight gored model, with two large pockets at the sides. The coat is the very new model called the "Pershing." It is utterly unrelieved by trimming of any sort, save for its military looking brass buttons, which are conspicuously used in a double row down either side of the front. It is exceedingly well cut, so that though it gives freedom of movement, it is entirely free from bagginess and presents a sharpness of outline that is part of its charm. It has an absolutely military collar, which is a feature of many of the smartest of the new models. The lining is of Zodiac Pussy Willow silk, showing lovely yellow, green and brown shadings, which are so effective with the aqua color.

Accessories of Outfit.

With this motor outfit are several tailored blouses of Sportussah in the tennis, gold and lime shades, all of which match artistically with the Nanken. A sweater has been made to accompany this outfit and is of gold Roshanara Crepe and is nearly as long as the coat. It is made in double-breasted fashion with a high collar so made that it could be turned down or worn high up around the throat. The fronts are closed with large, flat buttons of yellow glass. A hat, something on the order of the famous tricorne of France, in a small model, is of brown velour, with a trimming of a narrow brown suede band and large flat suede bow across one side, a "Koo-Koo" veil of brown and tan and a pair of "Kaptain Kidd" gloves completes a costume which, while absolutely practical, was as modish as could be imagined. For touring the wood, browns are ideal colors, as they do not show soil or wear as quickly as many other colors.

Specialties in Robes.

Every touring motor woman should be the possessor of a motor robe for her individual use, for there is no more comfortable covering to spread across the knees than one of these soft, woolly, blanket like robes, and gives just sufficient warmth for comfort at this season of year, when heavy robes are cumbersome and yet one needs some protection during the evening and on cool days. The Motor Weave Robes are extremely popular with motor women and are made in the most charming and artistic colorings. The Imperial is very attractive, having the United States olive drab body with line effect striping of blue, green and red, and a plaid back of navy, green and red. A very handsome Imperial Motor Weave Robe is one with navy blue body and reversible blue back. There are small squares of red dots on both sides. Seal brown, olive green, maroon, silver gray and the United States olive drab are seen in these unusually well made robes.

They are also of generous proportions, a feature which is of much importance in purchasing a motor robe.

Other Motoring Adjuncts.

The very latest adjunct to the motoring wardrobe is the new motor corset. It is made much the same as the French jersey corsets and has little boning, but in place of the jersey a substantial silk rubber is used. In this way the corset insures absolute comfort when sitting steadily in the car on a long tour.

Among the newest accessories for motor women is a hair net which every woman should possess. The net itself is no different from any other, but the value of the new idea is in the fact that it will stay put. Along the borders are fastened a number of little hairpins and a circle of double meshes passes through the middle part. Hairpins are also attached to this circle and are woven into the meshes. When one of these nets are adjusted it is there to stay until the wearer is ready to withdraw the multiplicity of little pins that hold it in place. Fitting so closely it has not the objection raised to some old style nets that the ends become loose and give an untidy appearance to the coiffure.

The Woman's Central Committee of Food Conservation in St. Louis has established a cannery near the produce section. Each night after the commission market closes they preserve the surplus of perishable fruits and vegetables.



When the Motor Woman removes her cover-all coat, it is not necessary she is properly frocked if she desires an attractive appearance. Her blouse and skirt are all of the very newest in chic fashions. The skirt is of moon-glo satin in dark blue.

Showy Models of Jones

6-60 Disclosed

ATTRACTIVE in body lines and constructed with standard chassis units, the Jones 6-60 for 1918 is announced by the Jones Motor Car Co., Wichita, Kan., either as a seven-passenger touring car or a five-passenger car with divided front seats. These body types sell for \$1675, while the former, equipped with a Victoria top, is listed at \$100 extra.

In mechanical construction the Jones model is especially interesting. The Lewis motor is used in all the 1918 series. The engine is a block design, $3\frac{1}{2} \times 5\frac{1}{2}$ inches, with the crank case and cylinder block integral. Outside and accessory parts have been eliminated wherever possible so that the engine presents a clean and smooth appearance. The crank case is ribbed and all the bearing brackets are supported in the case to prevent distortion due to crank case deflection.

A two-inch crankshaft of the "inherently balanced" type is used and the connecting rod and reciprocating parts are light in weight, so that vibration is reduced to a minimum. The valves are $1\frac{3}{4}$ inches outside diameter. The cylinder head is of the separate type and contains cored passages for water on the valve side of the head, as well as on the opposite side, thus overcoming the dangers of uneven cooling.

The method of mounting the starting and lighting system is one of the features of the Lewis engine. It is piloted directly into the crank case opening, which insures absolute alignment of shafts, making them oil tight and preventing any leakage around the instruments. A force feed and splash system of lubrication is employed, a positive plunger pump driven from an eccentric



Model 26 B Jones Touring Car for Seven-Passengers, Priced at \$1675; Below, the Same with Victoria Top.

on the camshaft being used. The thermosiphon system of cooling is used with extra large water passages, an unusually large honeycomb radiator and a belt driven fan mounted on a bracket at the front of the motor.

The starting and lighting system is of the two-unit type, with Remy distributor. The generator and starting motor are separate units, the starting motor being geared to the flywheel by the Bendix drive.

The drive and torque are transmitted through the springs by the use of a drive shaft with two universal joints.

A Stromberg carburetor with dash adjustment and Borg & Beck dry plate clutch are standard specifications on the

new series. Semi-elliptic springs, 40 inches long are used in front and the rear springs are 57 inches long and $2\frac{1}{4}$ wide. Oversize Timken axles with spiral bevel differential are used and the frame is a six-inch vertical section made of 5-32 inch .15 carbon steel.

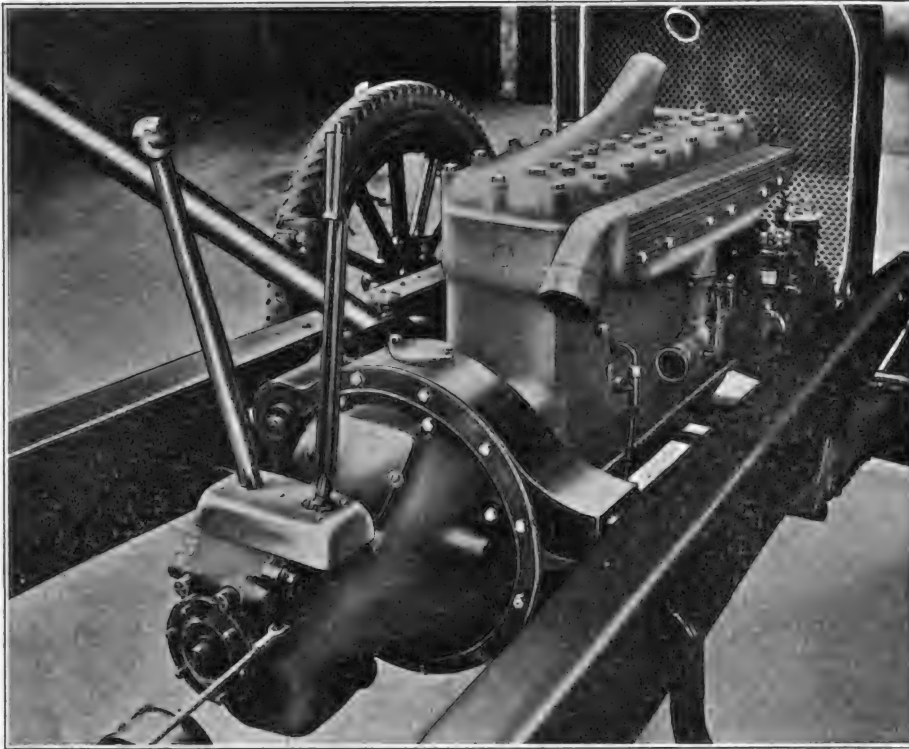
On the two touring models the upholstery is of a long grain, bright finish real leather. The fenders are full crown of heavy pressed steel and enameled black. The windshield is of the tilting type and adjustable. The wheelbase of the chassis is 125 inches.

In addition to their mechanical niceties and the supremacy given their cars by the new motor, the 1918 models appeal in their graceful lines to the lovers of artistic motor appearance. As pictured on this page the latest additions to the Jones productions show a complete harmony in lines. This company terms its five-passenger car a "practical" roadster, and as the picture reveals, it has distinctive lines of beauty, with an outward contour that is in full accord with latest approved practise in automobile design. The body has rounded edges with full crown fenders and wide running boards. Complete freedom is obtained from angles, sharp lines and edges which disturb the eye that is trained in things artistic and giving the car at the same time a solid and substantial appearance. There is a double cowl and a slanting windshield, features which further contribute to the effects already noted.

Top equipment is of the one-man type, including dust covers completely cover-



Jones Model 26 A Five-Passenger Roadster Carrying a Body with Rounded Edges and Fine Lines.



Neat Chassis Layout of the Jones 6-60, Showing Mounting of Lewis L. Head Type Block Engine.

"THE FORD MOTOR CAR TRUCK AND TRACTOR ATTACHMENTS."

"The Ford Motor Car and Truck and Tractor Attachments," a new manual by H. P. Manly, published by Frederick J. Drake & Co., Chicago, is a complete instruction book on every feature of the Ford products, as the title suggests. The subject of adjustments, repairs, upkeep and care is given special attention and each part of the car is treated with under separate heads.

C. T. SILVER WILL HAVE CAR OF HIS OWN DESIGN.

C. T. Silver, the well known New York dealer, who handled the Peerless car up to a recent date, has made arrangements with the Apperson Bros. Auto Co., Kokomo, Ind., for the production of a car of his design to be known as the "Silver-Apperson."

ADAMSON MANUFACTURING CO. ENLARGES PLANT.

The Adamson Manufacturing Co., East Palestine, O., have erected a large addition to their foundry building. The company is making Ford brake shoes, lined and unlined; light gray iron castings for automobile parts and other automobile specialties.

ing the bows. Other equipment includes quick adjustable side curtains and an electric horn, motor driven. The control board fittings include speedometer, ammeter, oil gauge, starting, lighting and ignition switches and carburetor, etc., mounted on the board in easy reach and plain view of the operator. The control board is electrically illuminated. Blue with special striping is the stock color for bodies, and special colors are furnished at additional cost.

HUPP DEVELOPING LIGHTER CAR.

J. Walter Drake, president of the Hupp Motor Car Company of Detroit, Mich., has announced that his company is developing a lighter car than the present Hupp model, which will sell at a lower price. Deliveries of the new car will be made toward the end of the present year, it is promised.

PIKES PEAK CLIMB CANCELLED.

Owing to the fact that car manufacturers, drivers and others who expected to participate in the Pikes Peak Hill climb, are engaged in war work, that event has been called off and it has been announced that no contests will be held on the famous mountain course until hostilities cease.

JAMES G. HEASLET WILL ASSIST HOWARD COFFIN.

James G. Heaslet of South Bend, Ind., formerly vice president in charge of production at the Studebaker Corporation plant, has been appointed a member of the Aircraft Production Board and will assist Howard E. Coffin.

LORRIES MADE OF CARS IN INDIA

American Cars in the Far East Are Transformed by Military Authorities

India should offer a big field for American automobiles, though new restrictions were recently made. There are about 15,000 cars in India now and the prompt manner in which the military authorities have turned them to military uses tends to keep them free from embargoes, which have interfered more or less with export since the beginning of the war.

The military authorities commandeered hundreds of cars of various American makes and transformed them in the railway shops for haulage when the demand for lorries became serious. One shipment of 400 Overlands was recently converted into light motor lorries for military use. The transformed lorries have given good service throughout India.



Overlands Converted for Haulage in the Bombay Railway Shops.

THE STORY OF A SUCCESSFUL MAN

Specializes With a Mechanical Trouble-Finder on Repairs of Electric Starting and Lighting Systems

AS A general rule the reason for one's success may be traced to circumstances, ability or equipment, and attention to details, and the story of J. S. Ellis of Oakdale, Cal., is no exception to the rule.

Mr. Ellis lived in the little town of Oakdale, which has a population of 1050, and after looking over the situation decided that though there were automobile repair shops making a business of general repair work, he would specialize and give the public service for the repair of electric starting and lighting systems.

He decided that the successful operation of the automobile depended upon the electrical installation, and that the

present time there are hundreds of different starting and lighting installations of various types, no two of which may be compared in any way but essentials. For one man to become familiar with all of the various systems would take years, and by that time as many more systems would probably spring up. Without definite knowledge of all of the systems, practical tests and repairs would consume many hours of valuable time and cause dissatisfaction among the customers.

Through Mr. Ellis' attention to detail and foresight the business has prospered from the start, despite the small population, and Mr. Ellis gives due credit to Ambu, because the use of it gave him

confidence to go after repair jobs, with the assurance that the finding of trouble would be a matter of minutes, rather than hours.

That Mr. Ellis' experience may be duplicated in other towns is possible. The success of the repair man depends upon his work. This means that to give the results he must be able to do the job not only well, but in a minimum amount of time. Many of the ordinary repairs to electrical systems require but a few seconds. To insulate a grounded wire requires but a minute, yet it frequently takes hours to locate the trouble, without suitable apparatus.

The device to which Mr. Ellis gives credit is an apparatus which has been designed along scientific lines, and may

be operated by the average lay man. It consists of the "trouble chaser," which is a specially designed volt ammeter, a set of instructions covering practically every electrical system now on the market, and a set of wiring diagrams of present day cars, as well as many that are "orphans."

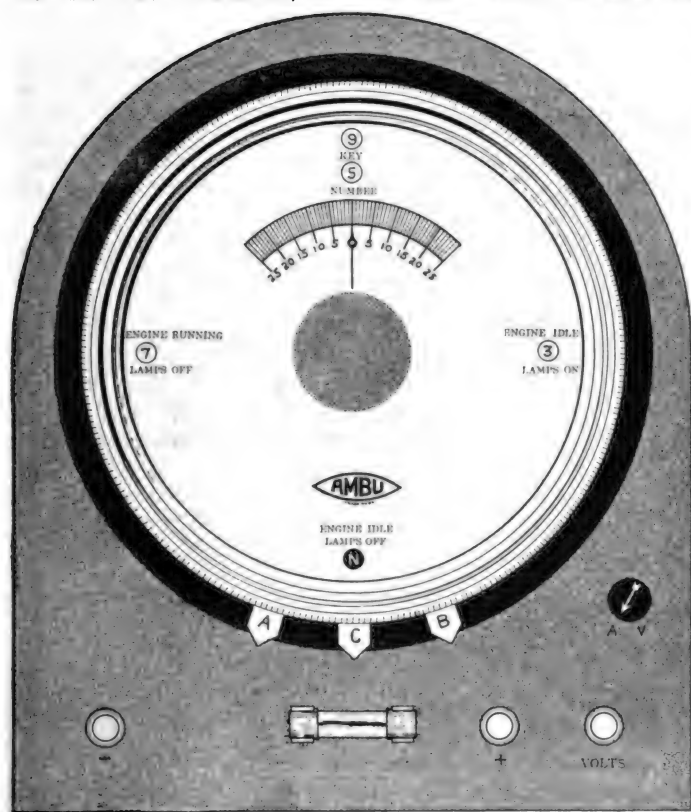
For special systems a special form of procedure in testing is necessary, and this form is carefully laid out in the book of instructions. The repair man simply familiarizes himself with the method of testing, then he makes his tests. As each test is made, if there is trouble, a number appears upon the "trouble chaser," which indicates a certain sec-



J. S. Ellis in His Shop, Oakdale, Cal.

tion in the instruction book. Under this section is given the troubles that might result in the reading given on the "trouble chaser." Sub-headings and special tests locate the trouble so that there is no doubt in the mind of the repair man. Should there be no trouble under that particular heading the "trouble chaser" indicates normal, and further tests are made, until the trouble is located.

The charts, diagrams and instructions are so laid out that the location of faults in the systems are merely a matter of routine, not requiring any special knowledge of electrical installation on the part of the operator.

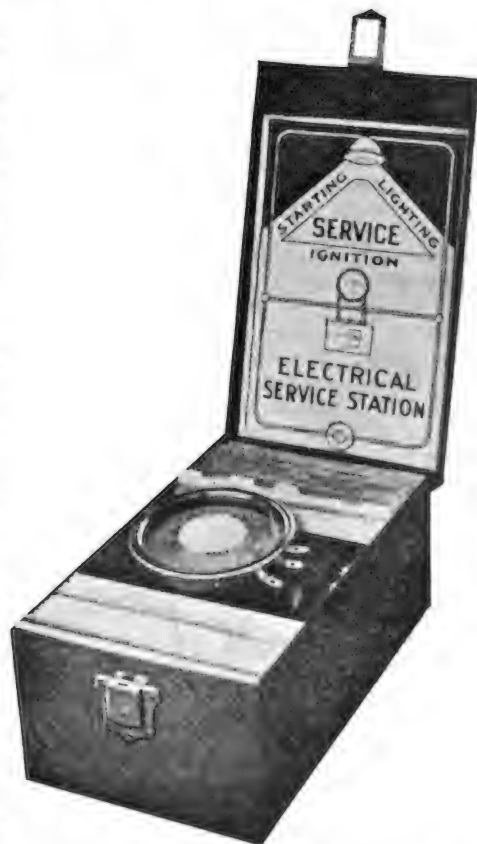


Dial of Ambu Trouble Shooter, Made by the American Bureau of Engineering, Chicago, Ill.

repair of the system demanded the work of a specialist.

His first move after his decision was to purchase a complete Ambu outfit. He realized that only by giving complete satisfaction could he hope to get the business. This meant that he could make absolutely no mistakes nor afford to try a guess on any job brought to him, if he wished to keep his reputation as an expert. He bought his equipment with especial attention to this policy. At the present time Mr. Ellis says that he has all of the business that he can attend to and from the business is earning a fine income.

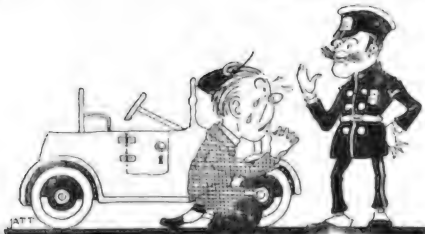
As every repair man knows, at the



Box Containing Ambu Service Station.

Some Graphic Items in and Around Motordom

The motorist in New York City, where they are the most numerous of any place in the world, has proven himself incorrigible beyond belief, so Magistrate House



of the traffic court has given his warning that no more leniency is to be shown the violators of the law. Traffic policemen have been warning motorists three times before bringing them into court for violations of the traffic law, but the magistrate, after fining one culprit \$75 and requesting that his license be taken away, stated that it was apparently useless to extend leniency.

A salesman arrested in Worcester for operating his car while under the influence of liquor pleaded with the court



for leniency on the ground that he had driven a car 65,000 miles and had never been brought before a court for improper driving or other cause. The judge, however, estimated that a bucking automobile could do as much damage at the end of a 65,000-mile trip as it could at any time during such a tour, and imposed a sentence of 30 days in jail on each of two complaints, the sentence to run concurrently. The salesman appealed his case and gave bail for appearance before the Superior Court.

In London, where gasoline is on a par with the price of a new straw hat and limited in supply at that figure, ingenious motorists have turned to operating their cars with illuminating gas, large air tight bags for holding the fumes



being attached to the tops of the machines. A sufficient supply can be carried to cover 30 to 50 miles. It proves quite a satisfactory fuel and costs less

than gasoline when the latter is obtainable. As suggested by our artist, the gas could be utilized to furnish additional facilities on the car besides operating the motor.

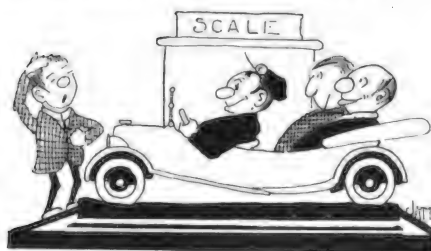
Of the few present day unthroned kings that continue to rule with royal sway, none is no more firmly ensconced upon his throne than Ephraim Johnson, who is the chosen ruler of all the Gypsies. Outwardly none would suspect his royal strain, but yet his authority is absolute and he needs none of the royal trappings and jewels to maintain his position. He even rides about in one of



the modest cars, but his adoption of a democratic automobile as the royal carriage has not diminished his standing in the eyes of his subjects one bit.

The Delaware motor law has been recently amended to restore reciprocity to outside motorists, and, hereafter, tourists from other states and operators of commercial vehicles will not be compelled to take out a separate license in that state to use the highways.

Out in a western state the highway department is giving all motorists a free weigh while they wait. As each machine comes along over the highway it is



stopped and the driver is requested to run his car with passengers upon a nearby scale. After the weight of the car and load is taken he is allowed to depart. This plan is used to determine the volume of traffic over the roads in that section.

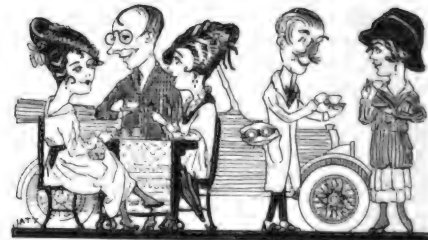
There are many places in the suburbs where the daily traffic on the roads is not sufficient to warrant the placing of traffic policemen at the dangerous crossings. On Sundays, when the riding is in large enough volume to call for such an officer, the town constabulary in these places is seldom so organized that one of its members can be placed on duty at the various cross roads within the town. This situation has been met in one of the

southern Rhode Island townships by calling for volunteers from the farms with the result that motorists are often surprised at the "make-up" of traffic cop



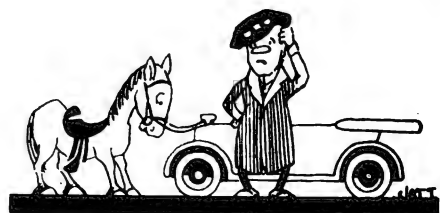
that gives them the stop and go signals.

The Chester County (Pa.) Automobile Club held a meeting at the farm of S. R. Dickey, Oxford, where over 600 members and their guests gathered to enjoy a collation and the speeches that were delivered by prominent Pennsylvanians. President A. P. Irwin of Chadds Ford presided at the meeting and introduced the following speakers: Thomas R. McDowell, Chester County Highway Commissioner; State Senator T. L. Eyre and



Rev. George H. Turner of Oxford. It was announced that the club had a membership of 700 and that the 1000 mark would be reached in the near future.

For many years as the motor car was coming into its own complaint was often heard from the owners of horse drawn vehicles that the new form of locomotion was a nuisance on the highways. Seldom, however, have we heard a wail from the motorist owing to his being inconvenienced in his liberties by the horse, although recently in a New England city an occasion for such complaint arose and it would probably have been registered had the owner of the machine which figured in the incident arrived on the scene in a hurry. An itinerant equestrian drove into the city square and noting the absence of a convenient hitching



post, drove over to the nearest motor car, tied the horse's bridle to the radiator cap and disappeared into the nearby refreshment parlor.

CURRENT VALUES IN THE USED CAR MARKET

Examples of Prices and Selling Points From Sales Houses in Eastern Cities Show Straightforward Handling of Big Trade Problem

SINCE the spreading of authentic information concerning used cars was taken up by The Automobile Journal in the spring numerous letters have been received from subscribers in which they have inquired for the identity and address of the people whose advertisements to sell cars have been reprinted in The Automobile Journal.

These advertisements were reprinted from New York, Boston and Providence papers, and so arranged as to show the wide range in the actual market value of the used car as substantiating proof that the propaganda to fix a schedule of prices for used cars was not only impracticable, but foolish. Having established the

point, advertisements of used cars from papers in the same cities are printed with the addresses of the sellers, showing clearly and authentically the actual market in used cars and enabling subscribers to locate any car in which they are interested.

A perusal of these advertisements will immediately convince one of the fact that the so-called used car problem does not appear in the light of a problem at all except as a legitimate business proposition, and it is also found that it is being handled very much the same as the new car business. Practically all the dealers give a guarantee to some extent. Some guarantee the tires for a time and

many will sell cars on time payments.

With sound business methods employed to market the used cars they are being removed as a dangerous element and the whole car market bettered. Much of the stigma that has depreciated the value of a used car has also been removed by the straight forward business dealings of most of the dealers. They usually advertise the price of the car, describe its condition and have available information regarding its former owners and the service it has been put to. In cases where no prices are given in the advertisements that information and other detail can usually be obtained by writing to the advertiser.

AUTOMOBILES

NEW YORK

ROSKAM-SCOTT CO.
High Grade Used Cars.

- 1917 STUTZ Bulldog Special; wire wheels.
 - 1916 PACKARD Runabout; twin six; like new.
 - 1916 CADILLAC Limo.-brougham; Westinghouse shock absorbers.
 - 1916 STUTZ Bulldog Special; like new.
 - 1916 NATIONAL 12 cyl.; 6-pas. touring.
 - 1917 COLE Tour.-Coupe; 4-passenger.
 - 1915 PEUGEOT 5-pas.; starting, etc.
 - 1913 SIMPLEX 38; Springfield convertible.
- Listed Cars For Sale.
- 1917 PIERCE 48; con.; new.
 - 1916 CADILLAC Touring.
 - 1917 HAL, new; town car.
 - 1914 FIAT 20; town car.
 - MERCEDES 40; collapsible.
 - 1914 PIERCE 48; convertible.
- 1896 Broadway.

Demonstrations. Easy Payments Arranged. Automobiles Traded.

\$7000 AUSTRIAN DAIMLER "60" four-passenger; "Twin Six" PACKARDS, other PACKARDS, PIERCE-ARROWS, CADILLACS (Runabouts, Touring, Landaulets, etc.), \$250 to \$2600.

OLDSMOBILES ("Baby"). "Fours" "Eights," \$600-\$750; SIMPLEXES, "38," "50," \$450 to \$1250; LIBERTY, \$700.

HUDSONS, 1915, 1916, 1917, Touring and Coupelettes, \$550 to \$1300; OVERLANDS, \$175, \$225, \$350.

Many other opportunities; daily arrivals. Bargains in Every Department.

JANDORF AUTOMOBILE CO.
303 to 307 W. 59th St. 1761, 1763 Broadway.

- 1917 BUICK Six Roadster; new; run only 300 miles.
 - 1916 seven-passenger, six-cylinder BUICK, D 55; perfect condition.
 - 1915 OLDSMOBILE, four-cylinder touring, model 42; perfect condition.
- Time Payments Can Be Arranged.
- AUTOMOBILE WAREHOUSE CO.**
156 West 56th St.
Money back if not as represented.

Brand new 1917 PULLMANS with electric lights and self-starters; guaranteed one year by manufacturer. Having purchased the 1917 factory output we will sell them at sacrifice. Time payments arranged.

NEW AMSTERDAM AUTO CO.
221 West 37th St.

AUTOMOBILES

- 1917 ROSS "8" Touring, \$850; elegant 7-pas. touring; cannot be told from new.
- 1916 KISSELKAR; Victoria brougham; beautiful town car; cost \$3250; cannot be told from brand new; only used 8 months; painted light Brewster green with cream colored wheels; one of the classiest motor cars in New York; has set of new Firestone non-skid tires, size 32x4½; must be seen to be appreciated; price \$1600.
- Beautiful 1916 COUPE; light 6; one of the classiest coupes in New York; seats four; chummy roadster style; beautifully finished interior; equipped with wire wheels; extra wire wheel and tire; cost \$3500; our price \$850; best bargain ever offered; must be seen to be appreciated.
- 1916 PACKARD TWIN "6"; elegant seven-passenger touring car; fully equipped with extras; set of slip covers; cannot be told from new; submit offer.
- 1916 BABY OLDSMOBILE \$650; five-passenger touring car; run less than 4500 miles; appearance and mechanical condition like a new car.
- MAXWELL CABRIOLET, \$375; almost new Cabriolet; mechanically perfect.

Time Payments.

Trades Considered.

NEW YORK MOTOR CAR EXCHANGE.
237 West 55th Street.

PACKARD AUTO EXCHANGE.
10 West 60th St. (Two Doors from B'way.)
Telephone Columbus-5078.

- 1916 "1-25" Touring, 7 pas.
- 1916 STUTZ Runabout.
- 1915 and 1914 S. G. V. closed.
- FIAT Racer Special.
- Packards, also Liberty Bonds Accepted in Payment.

AT LOWEST PRICES IN CITY.

- 1917 BUICK "Light 6" sedan.
 - 1917 STUDEBAKER "4" 3-pas. Runabout.
 - 1916 SAXON 6-cyl., 5-pas.
 - 1916 OVERLAND 5-pas.
 - 1915 NATIONAL 6-cyl., 5-pas.
 - MERCEDES Runabout.
 - PACKARD Berlin Limousine Bodv.
- GOTHAM AUTO EXCHANGE.**
1094 Broadway.

A MID-SUMMER SALE.

- 1917 DODGE 5-pas.
 - 1917 CHANDLER Sedan.
 - 1916 PACKARD Twin-6 Touring.
 - 1916 HUDSON Super-6 Sedan, wire wheels.
 - LANCIA 5-pas.; wire wheels.
- Many Others.
- R. S. IRELAND, 1648-50 Broadway.**

AUTOMOBILES

PIERCE-ARROWS; \$2000, while they last, will buy a rebuilt seven-passenger Pierce-Arrow touring car that will positively outwear any new car purchasable at twice as much. These cars are specially priced and cannot be duplicated. Fitted with new one man tops, self-starter, electric lighting and other very complete equipment. Guaranteed as we do new Pierce-Arrows.

ELLIS MOTOR CAR CO.
416 Central Ave., Newark, N. J.
Pierce-Arrow Distributors.

Select Used Cars.

Time Payments Arranged.

- 1916 MERCER Raceabout; perfect condition; special windshield and top; \$2200.
- 1914 MERCER five-passenger body; newly painted; mechanically perfect; \$900.
- STUTZ Bearcat; two-passenger; very fast; perfect shape; \$675.

R. C. GILHOOLY.
240 West 54th St.
Basement.

PROVIDENCE

- 1916 OLDSMOBILE Touring; \$750; eight cylinders; all non-skid tires; had little mileage.
- 1916 OLDSMOBILE Touring; \$650; four cylinders; 33x4 tires; just overhauled; 18 miles to gallon of gasoline.
- 1916 FORD Touring; \$250; crown fenders, rain vision windshield, 2 new tires; just painted.
- 1915 BUICK Runabout; \$400; self-starter, electric lights, 32x3½ tires, four cylinders.
- 1915 REO Touring; \$550; self-starter, electric lights, 34x4 tires, overhauled and painted; a roomy car and very economical car to operate.
- 1915 HUPMOBILE Runabout; \$500; in very good condition; \$150 spent on overhauling; run 500 miles.
- 1913 HUPMOBILE Runabout; \$350; self-starter; a dandy little runabout; all good tires; \$350.
- 1914 FORD Runabout; \$190; excellent condition; every extra; motor very quiet; traded in for larger car.
- 1913 HUDSON Touring; \$350; model 37; 4 cylinders; a beautiful car to operate; self-starter and electric lights.

W. MULRY.
97 Empire St., Providence.

AUTOMOBILES

See the greatest force and variety of used and rebuilt cars ever concentrated in our used car department, which is open day and evening. Surely you can find the car to "just suit" you on display. These prices are our lowest; no discounts in lots; 1913 CADILLAC Touring car with starter and lights and extras at \$390.

1916 OLDSMOBILE "4" Touring car; a car that has had the best of care by female owner; was \$850; price now \$690; \$350 cash, balance easy.

STUDEBAKER Touring car at \$500.

COLE six-passenger Touring car in fine order; a snap at \$590.

NATIONAL four-passenger Sport car; cost \$3200; electric starter and lights; 2 new tires; rest of tires good; A 1 condition; new paint; purple with white wheels; a stunner; rebuilt; price down to \$1200.

Guaranteed OVERLAND Touring car; five-passenger; in fine condition; guaranteed to Jan. 1; \$350.

FORD Sedan in fine order.

1916 VELIE five-passenger Touring car; like new; be sure and see this one; you can buy it now for \$690.

FORD Touring cars; prices very low.

Extra snaps; prices cut from \$400 to \$500; BUICK Touring cars; several to select from; \$300 and up; BUICK Roadsters; five of these; \$250 and up; MARION Touring cars at sacrifice prices; CADILLAC Touring car at \$250.

Three METZ Touring cars; if you are looking for the most for your money see these at our prices; \$250 up.

JEFFERY Touring car; five-passenger; electric lights and starter; a classy car at a bargain price; was \$750; now \$525.

STUTZ Roadsters; prices were \$850 to \$1000; if you are looking for speed now's your chance; prices for this sale \$550 up. SAXON Roadsters; \$150, \$250, \$325.

Model 83 rebuilt 1916 OVERLAND Touring car; a real family car that we guarantee until Jan. 1; \$500.

1915 KING Touring car; five-passenger; like new; a big bargain at \$590.

R. C. H. Touring car; in good order; our bargain price \$200.

AMERICAN SCOUT; in good order; paint and tires good; sold under guarantee; our low price \$490.

Prices are constantly going up. Terms to reliable people. You will never have such a chance again. Demonstrations given of any car we advertise.

PUGH BROS. CO.

53 Mathewson St., Providence.

Fall River Branch, 532 South Main St.

We Have For Sale at 773 Broad Street. 1917 HUMPHREY Touring car.

1916 STEARNS-KNIGHT small 4-cylinder Roadster.

1916 OVERLAND Touring car.

1914 CADILLAC Sedan.

1914 STUDEBAKER Little Six Sedan.

1915 CADILLAC Touring car.

1916 CADILLAC Touring car.

1914 CADILLAC Roadster.

We will take your old car in exchange. Time payments if desired.

CADILLAC AUTO CO. OF R. I.

A. J. FELTHAM, Manager.

We are in need of room at our sales-room and will sacrifice what used cars we have on hand. Every used car marked down from 15 to 25 per cent.

1915 FORD Touring; excellent mechanical condition; very reasonable.

CHEVROLET six-cylinder; mechanical condition perfect; newly painted and would make good family car; former price \$535; this week's price \$475; easily worth \$600.

EDWARDS & LANPHEAR MOTOR CAR CO.

17-19 Snow St., Providence.

AUTOMOBILES

BOSTON

AUTO SALES COMPANY.

112, 114, 116, 118 Worcester St.

Between Columbus Ave. and Tremont St.

Every attention is given to the mechanical condition of the cars we purchase and for this reason we can guarantee every car we sell exactly as we represent it. The safe place to buy. Read these prices and save money.

Easy Terms. Balance Monthly.

1916 BUICK \$675; touring car; run 3800 miles; little six model; just been thoroughly overhauled and looks and runs like a new car; equipped with all new tires, spare rim and tire light and inexpensive to operate.

1915 OVERLAND \$425; model 80 roadsters; two to choose from; one equipped with four brand new Kelly Springfield tires; overhauled and revarnished this was the best model made by the Overland Co.; cost new \$1125; three months' guarantee.

1916 MAXWELL \$375; Touring car, with self-starter, electric lights; in the finest possible condition; tires and paint new; demountable rims, one extra; shock absorbers; call for demonstration.

1915 CHEVROLET \$325; Roadster, with electric lights and extra shoe; always been driven by original owner, who has just traded for touring car; has been newly varnished and looks like new.

1916 FORD \$310; Touring car; equipped with many extras; 1917 style hood and radiator; Gray & Davis self-starter; electric lights all round; same size tires all round; two extra; shock absorbers; tire carrier; cost new \$685; rare bargain.

1913 STUDEBAKER \$190; light five-passenger touring; 22 miles on a gallon of gasoline; equipped with every possible extra; four doors, demountable rims, one extra rim and new tire, four new tires on car; this is a rare bargain; fully guaranteed; call for demonstration.

1915 OVERLAND \$385; five-passenger Touring car; model 80; this was the best model built by the Overland Co.; self-starter, electric lights, tires and paint like new, easy riding qualities unequalled; call for demonstration.

1916 MAXWELL \$375; Roadster, with self-starter, electric lights, in the finest possible condition; tires and paint new; demountable rims; one extra; shock absorbers; call for demonstration.

1917 CHEVROLET \$335; Touring, 4-90; used 1700 miles; self-starter, electric lights, absolutely like new; four new tires; this car was owned and driven by lady and has had extra good care; call for demonstration.

1916 FORD \$265; Touring car; fully equipped; many extras; shock absorbers, crown fenders, demountable rims, same size tires all round, bumper on front car; has had very little mileage and is in fine condition.

1917 FORD town car \$465; used privately about 900 miles; fully equipped; many extras; shock absorbers; same size tires all round; nobby tread; easy terms.

New 1917 FORDS; \$200 down, balance monthly; touring cars and roadsters; brand new; buy one of these cars now and pay for it as you use it; used Fords taken in trade.

1914 METZ \$185; Runabout; that we took in trade for a small touring car; has been recently overhauled at Metz factory; a fine bargain.

New 1917 MAXWELLS; \$300 down, balance monthly; brand new touring cars; immediate delivery; finest equipment; self-starter and lighting system; order one of these cars now; delivery will be short.

1917 FORD \$350; Touring car; used 100 miles; fully equipped with extras; we took this one in trade for larger car; come quick.

1916 SCRIPPS-BOOTH \$500; Roadster; used 1000 miles and absolutely like new; fully equipped; self-starter, electric lights, one spare tire and tube; call for

AUTOMOBILES

a demonstration of the car at any time. 1914 FORDS \$190; Roadsters; just been overhauled and painted; shock absorbers and slip covers; many extras.

Bodies, Bodies; 100 FORD delivery bodies, 6-post, open and panel; new 1917 Ford touring and roadster bodies; 1915 Ford town car body \$50; 1916 Ford town car body \$110.

1913 OVERLAND \$185; light five-passenger Touring car; in the finest possible condition; used by doctor and has had good care; will demonstrate anywhere.

We'll Arrange Terms to Suit You.

LANGHAM MOTOR CAR CO.

162 Columbus Avenue.

New and Used Cars.

All late models, been thoroughly overhauled and are guaranteed to be exactly as represented; don't miss seeing our cars before buying. Call for demonstration. Sold half down and balance monthly if desired.

1917 PACKARD 2-35 twin-six, seven-passenger Touring car; with two extra tires and rims; size of tires 35 by 5; only been run 6000 miles and is absolutely like new; not a scratch on the varnish; call for demonstration.

\$800; 1917 CHANDLER seven-passenger Touring car in excellent condition and is fully equipped.

\$800; 1917 MITCHELL Six Touring; seven-passenger; in perfect condition and fully equipped.

\$300; 1917 EMERSON Touring car; been driven less than 500 miles; this is a light car; has self-starter, electric, and is very economical to run.

1917 FORD Roadster; has had very little mileage and is like new.

\$800; 1917 STEARNS 8-cylinder Touring; seven-passenger; in excellent condition and is fully equipped; tires and paint like new.

\$750; CHANDLER Sedan; been thoroughly overhauled and newly painted and is in excellent condition.

\$385; 1916 MAXWELL Touring car; in perfect condition and fully equipped.

\$425; 1916 CHEVROLET Baby Grand Touring car; perfect condition.

\$275; 1916 FORD Touring car; in good condition.

\$650; 1912 PACKARD Limousine; seven-passenger; in excellent condition; fully equipped.

\$385; NATIONAL racy type Roadster; thoroughly overhauled and newly painted; tires all good.

\$1000; PIERCE-ARROW 6-38; landaulet; seven-passenger; with self-starter, electric lights, new tires and is in the finest possible condition.

\$750; S. G. V. Touring car; also landaulet body car in perfect condition; tires and paint perfect.

1915 HUDSON 6-40; seven-passenger Touring car in good condition; tires like new. \$235; 1915 FORD Roadster; like new; has had the very best of care.

\$185; 1915 METZ Speedster; in excellent condition; tires and paint like new.

\$250; 1914 OAKLAND Six Touring; seven-passenger; in good condition; has self-starter and electric lights.

\$400; American Touring car; fully equipped.

1912 MERCER Touring car; with wire wheels; one extra wheel and tire.

1917 STEARNS Limousine; 7-passenger; cost \$3800; run few hundred miles; will be sold at a sacrifice.

1916 STEARNS; 4-cylinder, 5-passenger Touring car; \$750.

1915 JEFFERY; 6-cylinder, 7-passenger Touring car; \$550.

1917 HUDSON Super Six Touring car \$950.

1916 CADILLAC 8-cylinder Touring car \$1050.

1917 BUICK Sedan; Little Six; \$1250.

FRANK E. WING.

N. E. Distributor Marmon Cars
562 Commonwealth Avenue.

AUTOMOBILES

1916 HUDSON Sedan Super Six model; all new tires.
1917 CHALMERS five-passenger; very latest touring model; delivered 60 days ago and received part payment on a closed model.

1916 CHALMERS 6-48; seven-passenger model; suitable for renting.
1916 SAXON Roadster; four-cylinder; electric starting.
1914 CHALMERS Master Six; large touring model at a very low price.

If we have the car that suits you the price will be made of interest also. Phone, write, call about time payments. Your old car taken in trade.

CHALMERS MOTOR CO. OF N. E.
620 Commonwealth Avenue, Boston.

AUTO CONSIGNMENT CO., INC.
601 Newbury St., Second Floor.

We Do Not Own a Car in the Place.

We will give 10 months' time on any car in the house.

Three 1917 METZ cars; one practically new and the other two slightly used.

1915 FORD Town car; in perfect condition; an ideal car for the renting man; easy terms on this car.

1916 STUDEBAKER; repainted, overhauled; will make a real trade on this one.
1914 CADILLAC Touring car at a real bargain.

1917 DAVIS; 7-passenger touring car; this car has been used for very little demonstration and will be sold at a large reduction, which must be within a very few days.

1917 MOLINE-KNIGHT; in excellent condition; this car is ordered sold this week for the high dollar; we have another one like it with wire wheels; in extra fine condition.

1912 PACKARD Roadster; starter and lights; overhauled and painted; three brand new tires; a real automobile at a real price.

1916 7-passenger CHANDLER; in perfect condition; owner says sell.

2 1915 CASE Touring cars; extra fine condition; this is a real automobile.

1914 MAXWELL Touring car; in perfect condition and a real buy for little money; five nice tires; car to be sold immediately.

1914 CADILLAC Coupe; car ordered sold as the owner was caught in the draft; must be sold for the high dollar.

\$800; with the advent of our new 3-25 and 3-35 series twin sixes, we have a limited number of 1917 model 2-25 and 2-35 twin six demonstrators to offer; these cars have been operated by experts; further than that they have been put in the shop, overhauled and repainted and our New Car Guarantee goes with each one; the prices are at a liberal discount; on cars of other makes we have cut prices to bedrock.

1915 WINTON six 7-passenger Touring car; mechanical condition excellent; just refinished; any one looking for a car of this make should see this one for \$800.

1915 CHALMERS Touring car; self-starter and electric lights; maroon finish with red wheels; a very desirable buy at \$300.

1915 REGAL 4-cylinder Touring car; presents a neat appearance, having been just repainted; this is a wonderful bargain and if you wish to take advantage of it it will be necessary for you to be here early Tuesday morning; \$300.

1915 8-cylinder CADILLAC Touring car; with a roomy 7-passenger body; just repainted; very powerful and easy riding; \$800.

1915 MITCHELL Touring car; painted dark blue; carries seven passengers; an easy riding car, which is in excellent condition, as indicated by its appearance; \$350.

PACKARD USED CAR DEPARTMENT.

1060 Commonwealth Avenue, Boston.
Providence, Worcester, Portland, Haverhill, Manchester, New Bedford.

AUTOMOBILES

Dodge Brothers Touring cars; 1916 production; choice of a limited number from \$500 to \$615.

1916 STUDEBAKER Touring \$465; 7-passenger, 4-cylinder, electric lights and starter; numerous extras; choice of two.

1912 STUDEBAKER Runabout \$165; four good tires and one extra, hand horn, good finish, excellent mechanical condition, speedometer and clock, tilted windshield; choice of two.

1916 METZ Touring \$290; electric starter and lights; extra tire; excellent finish; low mileage.

1916 CHALMERS Touring \$550; a light, smooth six 6-30; in fine shape throughout.

HENSHAW MOTOR CO.
915-921 Boylston St., Boston.

\$500; 1914 CADILLAC Touring; this car is a bargain at this price; complete equipment.

\$550; 1915 CHALMERS Coupelet; a fine 3-passenger car with complete equipment.

\$700; 1915 CADILLAC 7-passenger touring; in good mechanical condition and has one spare tire.

\$850; 1916 APPERSON 8-cylinder Chummy Roadster; this car is in excellent condition.

BEACON MOTOR CAR CO.
660 Beacon St.

PARK SQUARE USED CAR CO.
Motor Mart Building.

12 Columbus Avenue, Boston.

Cars Sold on System Plan.

Three Months' Tire Service on All Cars.
1916 PACKARD Touring 35; excellent condition; run 5800 miles; excellent tires; car as good as new.

Latest 1917 PREMIER Touring; five or seven-passenger; 8-cylinder; like new; car run 4600 miles.

1916 STUTZ Bulldog; wire wheels; two extra; excellent condition; special paint job; car very fast.

All-weather car; 1917 HUPMOBILE Sedan; slightly used.

1917 MAXWELL Cabriolet; all-weather Runabout; slightly used.

1912 DELAUNEY-BELLVILLE Limousine; five or seven-passenger; car built in France; good for 20 years' wear.

1913 WINTON; 7-passenger; all new tires, self-starter and electric lights, lots of power; car been used private.

1915 APPERSON; 6-cylinder Touring; newly varnished; car guaranteed.

1915 FIAT Touring; seven-passenger, with new self-starter and electric lights; car in wonderful shape.

METROPOLITAN USED CAR CO.
16 Columbus Avenue, Boston.

Your offer is invited on the following cars:

MARMON; 7-passenger; model 34; wire wheels; just been varnished and looks like new; was left here for an offer; call and we will demonstrate; then use your own judgment.

1917 CHALMERS Roadster; run 5000 miles; very economical and easy riding; just the car for salesman or small family; very roomy; see this and make an offer; will demonstrate any time.

PACKARD 1-35 twin six; 7-passenger; run 4000 miles; original tires and looks as good as new; can be bought at a saving of \$500; call early as this must be sold.

1917 MARION HANLEY; 6-cyl., 7-passenger; very powerful, substantial and well built car; cost new \$1600; used very little; lots of extras; make wonderful touring car; call early; will demonstrate.

Cash if you have it. Terms if you want it.

Free service with used Overland cars. 10 hours free service with partially overhauled Overlands from \$300 to \$500.

25 hours free service with overhauled Overlands from \$500 to \$800.

50 hours free service with rebuilt Overlands from \$800 up.

1917 model 85-6 OVERLAND Touring; 5-passenger; first one of these excellent light sixes on the market; good paint and tires

AUTOMOBILES

—one extra; Master carburetor, bumper and many extras; 17 miles on a gallon of gasoline.

1916 model 75 B OVERLAND Touring; roomy, stylish appearing car; in A 1 condition; easy on tires and gasoline.

1916 WILLYS-KNIGHT Touring car; equipped with the famous Knight silent sleeve valve motor. This motor becomes more quiet and powerful with every mile of use. Carbon increases the power. There are some 80 less parts than the average poppet valve motor. Revarnished and driven but 5000 miles.

FORD Touring \$225; excellent condition; Master vibrator; shock absorbers and bumper.

MERCER Touring car \$650; model H-35; newly painted; tires in excellent condition; two spare ones; very speedy and powerful.

1916 OVERLAND Six Touring car; 6-cyl., 45 horsepower, Continental motor. Seats seven people comfortably. Repainted a rich blue with gold stripe and cream colored wheels. Driven but little. Perfect tires.

1915 OVERLAND Roadster; model 81; a car you'll find very easy on tires and gasoline because it's light and extremely easy running. This type of car is rarely found on sale—they're snapped up too quickly.
1913 OVERLAND Touring car; equipped with U. S. L. starting and lighting system. Is in excellent shape. Good tires, etc. A fine family car for little money.

1916 PULLMAN Touring \$425; Cutler-Hammer electric gear shift. Practically new tires. Paint like new. Driven but 4500 miles.

CONNELL & McKONE CO.
533 Commonwealth Avenue, Boston.

"Home of Low Prices."
COLUMBUS MOTOR CO.
Al. Adams, Manager.
10 Columbus Avenue.

1917 AUBURN 6-48 \$975; seven-passenger, divided front seats; a powerful car; a fine proposition for the renting business; just like new.

1915 CADILLAC Touring \$695; seven-passenger; tires and paint, also mechanical condition, just like new; make sure you see this.

1914 HUPMOBILE \$375; Touring; electrically equipped; new shoes on rear; a very economical and sporty four-passenger; lots of power.

MAXWELL Special \$200; has just come out of paint shop; demountable rims; a powerful and trustworthy car for the rough roads and hilly country.

SUPER-SIX Touring \$980; seven-passenger; has been driven by gentleman just 3200 miles; looks and runs like a new one.

1914 APPERSON Touring \$390; a powerful car for the rough roads; has just been painted a beautiful blue with yellow wheels.

BASCOM'S USED CARS.
33 Stanhope Street.
Good Used Cars.

We will take any old car, large or small, in trade.

6-cylinder KisselKar; 7-passenger; good paint, white wire wheels, electric lights and starter; \$500.

6-cylinder THOMAS; new paint; overhauled; \$350.

4-cylinder KISSELKAR; 5-passenger; starter and lights; big bargain; \$350.

6-48 PACKARD Limousine; 7-passenger; leather lined body; \$400.

6-48 LOCOMOBILE; 1911; good repair; bargain; \$250.

1914 PIERCE "38" Touring \$1400; this perfect car is offered at this tremendous sacrifice owing to owner being obliged to realize some cash at once; electric self-starter and lights and five shoes practically new; must be seen to be appreciated.
1917 APPERSON Chummy \$900; has had very little mileage and is in finest condition; seats four and is powerful, quiet running and easy riding; high grade, popular

AUTOMOBILES

car; inexpensive to operate; call for bargain.

1916 HUPMOBILE Touring \$650; late model; in finest condition; readily worth \$900, but will sacrifice for quick sale; owner must go away this week; thoroughly demonstrated to intending purchaser.

1917 STUDEBAKER Touring \$600; six-cylinder; just been thoroughly overhauled and repainted and looks like a new car; excellent light 6-cylinder car; suitable for family or renting purposes.

1916 OVERLAND Touring \$400; model 83; excellent condition throughout and original paint and shoes good; powerful, quiet running and easy riding; call for thorough demonstration.

MAXWELL Runabout \$115; in finest running order and fully equipped; all good shoes and paint perfect; a fine light run-

AUTOMOBILES

about; inexpensive to operate and plenty of power; call for bargain.

1917 CHANDLER Touring \$850; this popular, light family touring car seats seven and is in finest condition throughout; all good shoes and extra and motor is quiet running and powerful; call for thorough demonstration; guaranteed.

1917 OAKLAND Touring \$650; little six; in finest condition and fully equipped; original paint excellent and all good shoes; excellent power; climb any hill; call and see this one.

1915 BUICK Runabout \$400; model C 24; been thoroughly overhauled and repainted and positively looks and runs like a new car; powerful and speedy; excellent trade for doctor or salesman; call.

1917 HUDSON Super Limousine; used by private family only six months and can-

AUTOMOBILES

not be told from a new car; paint, tires, etc., perfect; an excellent family car or suitable for renting purposes; fully guaranteed and thoroughly demonstrated.

1917 BUICK Touring \$775; light six; model 4; brand new shoes and tubes and very powerful and quiet running; call at once for thorough demonstration of this fine, light touring car.

1916 MAXWELL Runabout \$385; this fine, light runabout looks and runs like new; has all possible extras and is light, inexpensive to operate and very powerful; call for thorough demonstration.

1913 HUDSON Touring \$250; model 6-54; Delco electric self-starter and lights; all good shoes and car has been repainted and looks and runs like new; call.

GEORGE GROW.

321-323 Columbus Avenue, Boston.

TAPPING IVORY—A CITY GARAGEMAN'S GROAN

Demonstrating How the Disregard of a Valuable Mechanical Tip Brings the Usual Lamentable Results to the Motorist

"YOU remember how Billy Sunday hit his hearers over the head with verbal hammers when he threw his oratorical clutch into high gear?" The city garage man smiled as the joyous memory surged through his jaded being and launched the odd question fair at the head of his sympathetic visitor. Involuntarily the latter, a tool salesman, winced a little as if expecting a blow above the ears himself. "Well," the garage man continued, "that is just about how hard some car owners must be struck to awaken them to the fact that a lack of mechanical sense is one of the motorist's greatest drawbacks."

"About 50 per cent. of them don't know the smallest thing about their car; they can't make minor repairs, nor can they make the little adjustments that are so



necessary for keeping the machine in satisfactory condition. If they only realized how little they know they surely would be more excusable; but they don't and one of the most aggravating ways that they take for proving their lack of knowledge is in their asking for advice, then going out and with total disregard for the good 'tip,' doing just what they want to.

"Take for instance Mr. Perkins, who is as good an example of an average car owner as I know. He feels able to cope with all of the ordinary forms of car ills and though he invariably asks me for advice, he seldom follows it.

"About a week ago Mr. Perkins came into the garage and asked what he could do to fix up the clutch on his car. The clutch is of the cone type, lined with



fabric, and the grease and dirt had accumulated until the facing had smoothed over. I was pretty busy at the time or I should have done the work myself; as it was I told him to give the fabric a kerosene bath, with a final treatment of neatsfoot oil. The kerosene would have dissolved the oil and grease and the result would have been a decent clutching surface. The neatsfoot oil would have softened the fabric and kept it in condition.

"Mr. Perkins listened carefully, with a knowing smile on his face, and then went away. He came back yesterday. There is his car! Look at that clutch! The facing looks as though it had been through a month's treatment on an emery wheel. It will take about four days to repair the car if I can find the time.

"What do you think he did? He had heard that Fuller's earth would solve the problem of a slipping clutch, and since this remedy was somewhat easier to apply than the one I recommended, he tried it. It didn't work quite as satisfactory as he had expected, so he tried a little sand, and I imagine, to judge from the appearance of the clutch, a number of other things.



"Some of the things that happen in this business are truly lamentable. If a competitor doesn't get hold of your best sale prospect, some friend grows ossified above his goggles and brings the grief in here. Look at my predicament!

"If I want to keep his business I must repair his car at a loss, as I sold it to him, and I want to keep him satisfied. Isn't it funny? When a man buys a car he seems to think that no matter what he does or how he uses the car the car should give perfect performance. He never blames himself for any trouble that he may have caused. Do I want any goods today? Well I have enough tools on hand to remedy any sort of car trouble that comes in here, but the overhaul of the car's master is always de-



manding new equipment. If your house has a stock of Billy Sunday hammers, send me a dozen right away."

QUEBEC ABOLISHES THE CURBSTONE GAS PUMP.

The city engineer of the City of Quebec, following instructions from the by laws committee of the council, has ruled that no more gasoline pumps can be installed on the sidewalks at the curbing.

MONTREAL SHOW TO BE HELD JAN. 19-26.

The annual show of the Montreal Automobile Trade Association will be held Jan. 19-26, 1918. Manager T. C. Kirby reports applications for 7000 square feet of floor space and the prospects point to a successful exhibition.



THE HOT PIN MANIFOLD.

If the experience of Europe is a reliable guide, this country will soon face a serious gasoline shortage. In both England and France, gasoline cannot be secured for pleasure cars or private purposes. Since kerosene is a logical substitute for gasoline, many motorists are on the lookout for equipment so they may utilize this fuel. Among the devices now on the market for the purpose of vaporizing kerosene is the Hot Pin Manifold, so called because of its peculiar construction. Cast integral with the exhaust manifold is the intake. Projecting into the intake passage are numerous pin shaped studs that absorb the heat from the exhaust and transmit it to the incoming gas, much the same way that projecting fins on an air cooled engine, radiate the heat to the passing air.

By this construction two things are accomplished; the incoming mixture is thoroughly vaporized and made fit for combustion, and the exhaust gases are cooled, thereby keeping down the engine temperature.

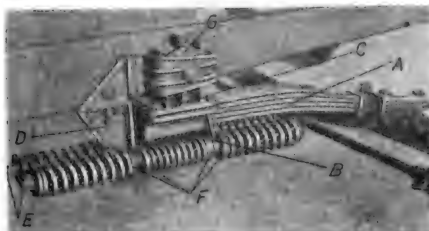
It is said that with this device the kerosene is fully vaporized or a better vaporization of gasoline is obtainable if that fuel is used. The carburetor is of the two feed type, with connections to a main kerosene tank and an auxiliary gasoline tank for starting.

Manufactured by Kerosene Burning Carburetor Co., 9 Selden Ave., Detroit, Mich. Write for prices and literature. Dealers write for proposition.

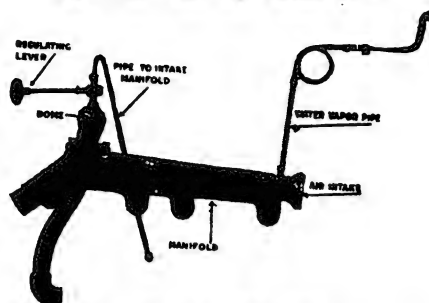
CANTI-COIL SPRING SUSPENSION.

The perfect spring suspension will need no shock absorber, since to absorb shocks is the function of the springs. At the present time the average spring suspension is designed to absorb the road shocks to a certain extent, transmitting the balance of the upward thrust to the body, since the suspension is direct.

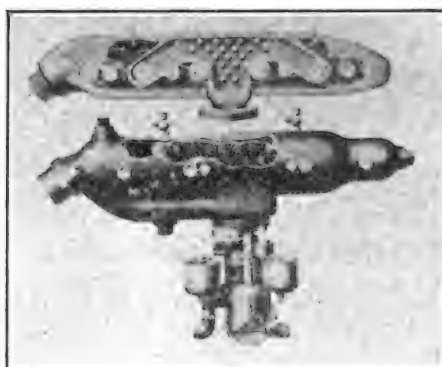
The manufacturers of Canti-Coil Spring Suspension have designed a suspension that supports the chassis, in an indirect manner, so that upward thrusts, or downward drops of the axles are absorbed or nullified by a system of longitudinal springs and reducing leverages, making what might be termed an indirect suspension. It is said that so great is the lever reduction and soft the spring action that the wheels may follow the contour of the road, while the body floats along dormant, so to speak.



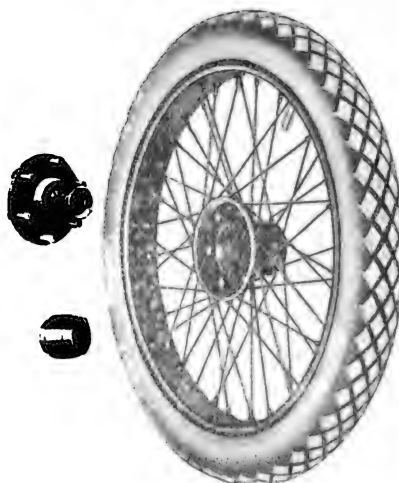
Canti-Coil Spring Suspension.



The Hiatt Manifold.



The Hot Pin Manifold.



Dayton Wire Wheel.

With this system of suspension the manufacturers claim not only are the road shocks nullified, but side sway, torque and effects of rapid braking are greatly reduced.

Manufactured by Reading Chassis and Motor Co., Reading, Pa. Write for prices and specifications.

THE HIATT MANIFOLD.

A device for a more full utilization of fuel is called the Hiatt Manifold. It consists of a manifold fitted to take the place of the regular Ford manifold, but differs from it in that it has a hollow pipe on the inside of the body. This hollow pipe takes through it air from the outside, which combines with water vapor coming from the radiator through a small copper pipe. The mixture passing through the pipe is superheated, due to the exhaust gasses passing around the internal pipe, and upon collecting in the dome, the superheated vapor laden air, gaseous in form, is passed to the intake manifold and mixed with the gas from the carburetor.

The manufacturers claim that in tests the manifold averages from 26.7 to 32 miles on a gallon of gasoline, in a Ford touring car, containing four people. As a comparison, tests made with the same car, but without the Hiatt manifold, averaged but 17.1 miles to a gallon. In addition to the high mileage, it is said that the device makes a smoother running engine, gives more power and eliminates carbon.

Manufactured by the Hiatt Manifold Co., Indianapolis, Ind. Price complete, \$15. Dealers write for special offer.

DAYTON WIRE WHEELS.

The Dayton quick detachable wire wheel here illustrated is a new high grade product manufactured to meet the demand for a wire wheel for the Ford car. Due to the flexibility of the wheel more tire mileage is claimed when this wheel is used. In addition to this is the convenience of changing wheels rather than tires in case of a puncture. Great strength combined with stylish appearance are outstanding features claimed for this wheel.

Due to the abilities of its force to secure raw material, the manufacturers say that they will be able to make deliveries on all orders. For further information write to

The Dayton Wire Wheel Co., Dayton, O.

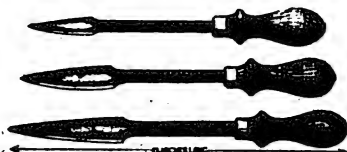
DOVER LIGHT BULB CASE.

Stringent laws exist in practically every state relative to lights on automobiles. To drive an unlighted car after dark is a criminal offense and punishable by heavy fines in most states. To avoid the annoyance and pecuniary losses entailed by the burning out of bulbs and the attendant unlighted condition, every owner should always carry a complete set of spare bulbs. To carry the bulbs in the tool box in a loose state would undoubtedly result in their breakage, so the Dover electric light bulb case has been designed. The case is made of extra heavy steel and seamless. The bulbs are held in place by spring clips and it is said that they are kept in better condition than those on the car in use. The dimensions of the box are 5½ inches long, 3¼ inches wide and 3¾ inches high. The cover is fitted with an automatic spring catch.

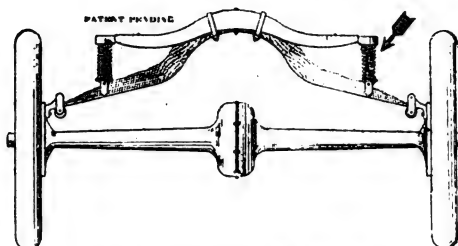
Manufactured by Dover Stamping and Manufacturing Co., Cambridge, Mass. Write for catalogue and prices.



Dover Light Bulb Case.



Stevens Bearing Scrapers.



Ford Relief Spring Applied.



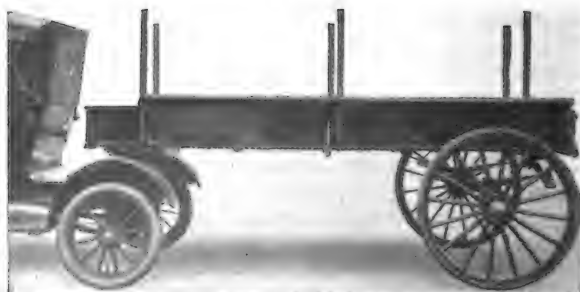
Handy Push Button.

STOCKBRIDGE SEMI-TRAILER.

In the July 10th issue of the Automobile Journal appeared a description of the Stockbridge Semi-Trailer, made by the Stockbridge Body Co., 130-6 Union St., Springfield, Mass. As the illustration used was of the same firm's Springfield body, the correct illustration, showing the method of attaching the semi-trailer, is reproduced herewith.



Crowe Fan Belt.



Stockbridge Semi-Trailer.

SCHRADER PRODUCTS.

A. Schrader's Sons, Inc., of 800 Atlantic avenue, Brooklyn, N. Y., announce a slight advance in the retail price of some of their products. The Schrader universal tire pressure gauge and the Twitchel air gauge has been advanced from \$1 to \$1.25. The price of Schrader universal valve insides, which hitherto has been 25 cents a box of 25, is now 30 cents.

CROWE FAN BELT.

The Crowe mechanical fan belts are of unique construction, being made up of links and containers which hold flat leather inserts. It is claimed that with this combination of steel chain and leather friction surface the belt is both flexible and has great gripping power. The manufacturers say that but little tension is required for maximum efficiency and that direct contact is assured at all speeds.

The links are adjustable and removable. The leather inserts being slipped from the belt at the side, allowing the attaching or removing of links as desired.

Manufactured by Mechanical Belt Co., 1202 Frederick Ave., St. Joseph, Mo. Write for prices and literature.

HANDY PUSH BUTTON.

To be effectual an automobile warning signal must be so placed as to be effectual at a moment's notice. The Handy horn push button is designed with a holder so that it may be placed over the centre nut of the Ford steering wheel and wired to the regular Ford button equipment. When this is done the movement of one hand seven inches is sufficient to reach the button and sound the horn.

Manufactured by the Francis-Rand Co., Cleveland, O. Price 75 cents.

STEVENS BEARING SCRAPERS.

To give satisfactory results a connecting rod or babbitt bearing must be scraped to fit the journal. Improperly contacting surfaces result in short service and sometimes damage to the engine. The Stevens bearing scrapers are made from drop forgings, carefully hardened and ground to edge. They are made in convenient shapes and come in sets of three as illustrated, the largest being 13 inches long.

Manufactured by Stevens & Co., 375 Broadway, New York, N. Y. Write for prices.

FORD RELIEF SPRING.

To form a frame support and distribute more evenly the frame weight upon the spring of the Ford car, the Ford relief spring and frame supporter has been designed. This device consists of two heavy coil springs with fittings which are attached to the outer ends of the frame member and to the spring retaining clips. In this way the weight of the frame is supported by the spring at three points rather than simply at the centre. The manufacturers claim that with this type of spring support the life of the regular spring is lengthened, the resilience of the suspension increased and side sway absorbed.

Manufactured by Ford Relief Spring and Frame Supporter Co., 76 East 42nd St., New York, N. Y. Price per set \$8.

PEERLESS ANTI-FREEZE LIQUID.

The makers of the Peerless products have added an anti-freeze radiator liquid to their line, which is called Peerless anti-freeze liquid. The liquid is sold in one-gallon cans, and in barrels, and is mixed with an equal amount of water to secure a freezing point of 15 degrees below zero. For lower temperatures more liquid is added and at a proportion of two parts anti-freeze liquid to one part water, the mixture will not freeze until 35 degrees below zero has been reached.

The manufacturers recommend that the liquid be purchased by dealers in barrels and sold in bulk, as oil is now sold. Accompanying each can is a chart which gives the approximate amount of liquid needed for some of the leading cars, as well as the proper proportions to use for low temperatures.

Manufactured by the Columbus Varnish Co., Columbus, O. Write for prices and dealer's proposition.

The Business Side of the Motor Vehicle Industry

John F. Bowman, formerly director of sales of the Federal Motor Truck Co., has been elected vice president and director of sales of the Acason Motor Truck Co. of Detroit. Mr. Bowman was



John F. Bowman, Vice President, Acason Motor Truck Co.

connected with the Oldsmobile company at the time that concern was making its single-cylinder model. He later became connected with the Federal Motor Truck company and, under his direction the sales of Federal trucks were among the largest in the world. The Acason Motor Truck Co. manufactures a complete line, including a 1½-ton, two-ton and 3½-ton and five-ton models.

R. R. Potter has been appointed engineer of production of the Fuller & Sons Mfg. Co., Kalamazoo, Mich., and will have charge of all the engineering work incident to production. William Mitchell has been appointed production manager.

Henry Hower, Edward McEwan and J. J. McDuffee of the F. B. Stearns organization have taken positions with the Willys-Overland company. Mr. Hower, who was formerly sales manager for the Stearns company, has been appointed sales manager of the Willys-Knight cars. Mr. McEwan was secretary and treasurer of the Stearns company.

R. E. Trout has joined the sales organization of the Puritan Machine Co., Detroit, Mich., and will specialize on service for Pullman cars, which is the latest one that has been added to the long list of cars for which the company supplies parts. Mr. Trout was formerly director of purchases of the Pullman Motor Car Company, York, Pa.

The Mason Tire and Rubber Co., Kent, Ohio, has plans for the erection of several additions to its plant in the spring. Several buildings on the plant site are now in course of construction. Work on a new office building will be started soon. The vulcanizing room is being enlarged by the addition of a two-story building,

40x84, and a new mill room, 60x109 feet, is also in course of erection.

The Racine Auto Tire Co., Racine, Wis., has acquired the plant formerly occupied by the Fish Bros. Wagon Co. in that city, which has a total floor area of 250,000 square feet of floor space. When ready for occupancy a force of 600 employees will be required and will increase the production to 1000 casings and tubes a day.

The Turnbull Motor Truck and Wagon Co. has been formed at Defiance, O., with a capital of \$1,000,000. W. O. Allen, general manager of the Allen Motor Co., Fostoria, O., will head the new company, which will manufacture a 1½-ton truck.

W. J. Drumpelman, formerly assistant sales manager of the Chalmers Motor Co., has been appointed assistant general manager of the Elgin Motor Car Corporation of Chicago and will devote his attention to the advertising and distributor organization.

Frank B. Stearns, one of the oldest men in the automobile industry and founder of the F. B. Stearns Co., Cleveland, O., has retired as president of the company, although he retains the chairmanship of the board of directors.

Guy Core, formerly advertising manager of the Redden Motor Truck Co., has been appointed advertising manager of the Briscoe Motor Corp. to succeed Robert T. Walsh.

The Paige-Detroit Motor Co., Detroit, Mich., has leased the old Williams Bros. plant at Humboldt and Grand River, in that city, and will use the buildings as an assembly plant.

The Murray Motor Car Co., Pittsburg, Pa., is introducing two new models for the 1918 season in addition to the seven-passenger touring car, a four-passenger touring car and a roadster, both incorporating similar body lines and a radia-

tor of the Rolls-Royce type. The bodies are constructed of aluminum throughout. The same chassis is used on all models, having a 128-inch wheelbase, and all models sell at the same price, \$2800 f. o. b. Pittsburgh.

The Fageol Motors Co., San Francisco, Cal., will soon start manufacturing operations in its new plant, the first unit of which is nearing completion. The company will make passenger cars, trucks and tractors.

The Ericson Mfg. Co., Buffalo, N. Y., has started work on a new plant, which will be ready for occupancy in October.

The Geronimo Motor Co., Enid, Okla., will occupy its new plant on or about Oct. 1 and commence production of a four-cylinder passenger car and tractors.

The Electric Storage Battery Co., Philadelphia, Pa., has declared a dividend of \$1 a share on both the common and preferred stock of the company, payable Oct. 1 to stockholders of record Sept. 17.

A. R. Mosler & Co., New York City, has received a large order for Mosler mica core spark plugs from the government.

C. A. Shaler Co., Waupun, Wis., is planning the erection of several additional factory buildings this fall.

The Anderson Motor Co., Rock Hill, S. C., has been granted a patent for a motor vehicle body that can be converted from a two-passenger into a five-passenger type. The patent was taken out under the name of "convertible sport body" and incorporates 13 claims. The patent number is 1,233,957.

The Maxwell Motor Co. has started construction work on the new Maxwell plant at Windsor, Ont., which will supply Maxwell products to the British trade.

The Saxon Motor Car Corp., Detroit, Mich., lowered the price of its four-cylinder models from \$495 to \$395, reduction to be effective only during September.



Modern Daylight Plant of the Hanes Rubber Co., Winston-Salem, N. C., Which Recently Began Turning Out Automobile Tires and Tubes.

It's Profitable to Fill Replacement Orders With

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It's decidedly good business to fill all orders for replacing broken springs with Harvey springs because you prove once and for all that you are giving the customer absolutely the best the market affords.

Men like to be put wise to a good thing and your recommendation of Harvey springs makes a permanent friend of the customer—he'll come back to you again and again for other repairs and supplies.

The Harvey Patented Process of forming and tempering insures a quality that defies breaking or sagging. They are

Guaranteed From End To End Against All Defects

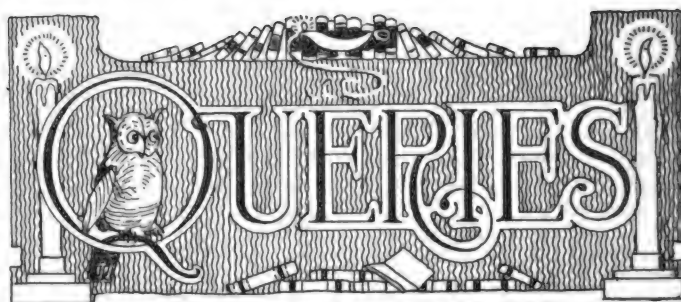
FREE

All Dealers, Garagemen and Repairmen should write for the Harvey Auto Spring Book, No. 4 just off the press, which contains a complete list of springs for all the leading makes and models of cars—gives sizes, weights, measurements, prices and other valuable information. We mail it free.

THE HARVEY SPRING CO.

851 17th Street

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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU REMOVE CARBON FROM YOUR ENGINE AND HOW DO YOU KEEP THE CYLINDERS CLEAN?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of October. The contest is open to every one.

RUNNING IN CAR TRACKS.

(H. Weikel, Quakertown, Pa.)

Running in car tracks is very injurious to tires because when this is done the side walls receive a certain amount of friction for which they were not designed.

By design the side walls of a tire are not so thick as the top or tread and when the tire is forced along the tracks the wear and friction is concentrated against the sides, as well as the top. As soon as the rubber protection is worn off the fabric is exposed and deterioration begins, progressing rapidly until the tire is completely destroyed.

Everyone realizes just what happens when a pair of rubbers are worn on the feet that are just a little smaller than the shoes. The sides, or "uppers," turn over, bringing them into contact with the ground. The excessive wear breaks them down and cracks develop even before the soles begin to show signs of wear. The same thing happens to a tire when it is run on a car track. The construction of a tire is made to conform to the same conditions of stress that a pair of rubbers for the feet are. Corresponding to the sole of the rubber is the tread of the tire; next comes a breaker strip, which is designed to make the tire more flexible and form a connecting strip between the tread and body of the tire. This strip corresponds to the flat strip which forms the body of the rubber. Then comes the body of the tire, which is made of soft pliable rubber over a woven fabric. This corresponds to the upper part of the rubber overshoe and is designed to keep the air pressure, but not for frictional contact with the road.

MORE CARBON TROUBLE.

(R. S. T., Marcy, N. Y.)

Since writing you last I have installed a set of four leak proof rings in my car, drilled the pistons as you sug-

Fires Every Time and Keeps Firing Why?—IT CLEANS ITSELF



The plug with a mechanical device that prevents fouling due to oil and soot. Automatically keeps the sparking terminals clean. A positive cure for all excessive lubrication troubles.

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gested and am using heavy motorcycle oil. I am still troubled with excess carbon deposits in the cylinders, however, and a carbon knock develops at the end of about 700 miles. Is there any other remedy that you know of? I have a water vaporizer attachment, but cannot connect it anywhere but back of the butterfly valve. Do you think that the device would work satisfactorily if I did this?

With your equipment of leak proof rings and with the piston holes drilled as we recommended you should have little or no trouble with carbon.

Relative to oil in the system there are two extremes, either of which might result in trouble—too heavy oil or too light. Where the oil used is extremely heavy, it will accumulate upon the cylinder walls and in the piston ring grooves; in addition to this its extreme capillary action will result in the filling of the drain holes which you have drilled in the pistons. At every upward stroke of the piston a certain amount of the oil will be forced upward, finally finding its way into the explosion chamber, where it carbonizes. Since your engine is of a different type from a motorcycle engine, the heavy carbonization of heavy oil is not blown from the cylinders as it would be in a motorcycle.

This heavy oil will deposit upon the rings and gum them so that they do not function properly.

Oil that is too light will work by the rings into the explosion chamber and carbonize. We would suggest that you drain out all of the old oil, clean the engine thoroughly with kerosene and try a medium grade of oil.

Have you examined your valve setting? It is essential that the valves open to their maximum or the heavier products of combustion will not exhaust. While the engine is heated examine the clearance between the valve stems and valve lifters or tappets. This distance should not be more than the thickness of a business card and should be adjusted carefully.

It is hard to say just how the vaporizer would work if it were placed between the butterfly valve and the engine. It is probable that the results would be unsatisfactory, as the vacuum formed when the valve was closed would result in excess vapor in the cylinders. The engine would "load up" on water vapor. We suggest that you take this matter up with the vaporizer manufacturers and get their opinion.

INSTALLING ALUMINUM PISTONS.

(A. N. S., Rochester, N. Y.)

I have a 1915 Chandler car and intend to overhaul the engine. At that time I should like to equip it with aluminum pistons if you will advise me as to whether you think the installation practical. What advantages do these pistons have over the cast iron type? What will be the approximate cost of the installation?

We give you herewith some of the advantages claimed for the aluminum piston as claimed by the makers of this type of pistons.

The average weight of an iron piston is approximately $3\frac{1}{2}$ pounds, and, working upon this basis let us assume that an engine running at a normal speed of 1000 revolutions per minute has six cylinders. At the end of every revolution the piston and connecting rod in each cylinder will have been stopped twice, or, in other words, the direction of its travel will have been reversed two times. As there are six cylinders, for every minute 42 pounds will have been accelerated to about 1000 feet per minute and stopped 1000 times.

To accomplish this one can see that an appreciable amount of power is necessary. Since the weight of the aluminum piston is only about half that of iron, the saving in power is noticeable. Not only is there a saving in power, but higher engine speeds are possible without the attendant strain that such speeds would bring upon the bearings of an iron piston equipped engine.

Quicker acceleration is another important point in favor of aluminum. This point, together with the minimizing of vibration, bring forward two big factors in favor of aluminum for racing cars.

The reciprocal action and its attendant pound upon the connecting rod and crankshaft bearings has a great effect,

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Save Shoe Leather

Conserve America's Dwindling
Supply, for Its Most Valuable Uses

THE world faces a leather famine. Tremendous demand and decreasing supply have caused an alarming scarcity. Sole leather has already sold for over a dollar a pound. Shoes have advanced from 50 per cent. to 100 per cent. and shoe manufacturers predict that, without quick relief, leather shoes of good grade will sell for \$15 to \$20 a pair.

The largest leather consuming industry is the shoe business. Automobile upholstery ranks next. Every automobile upholstered in leather takes leather enough to make 3 dozen pairs of shoes. Hence:

*Motor car buyers must soon decide
which they will do without—leather
in shoes or leather in automobiles.*

Du Pont Fabrikoid Motor Quality offers the best solution to the problem. More cars are now upholstered in it than in any other material.

Those automobile makers still using split leather acknowledge to us that it is inferior to Motor Quality Fabrikoid, but they hesitate to adopt the latter for fear some buyers may still think split (commonly sold as "genuine leather") is better. When buying an automobile tell the dealer you prefer one upholstered in Du Pont Fabrikoid Motor Quality. You will get a more serviceable—more lasting and more superior upholstery than split leather and you will do your share in the conservation of leather.

Many cars are already upholstered in Du Pont Motor Quality Fabrikoid. You can get it on any car if you will ask for it.

Write for names of makers using it.



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COMPANY**

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Original in Design,
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users
better

by all
as the
Magnetos

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HEINZE ELECTRIC COMPANY



**You Can Use Your Car All Year
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Garage With a**

"SUPERIOR" or a "COSY"

Safe Garage Heater

All air taken from outside building.
No gasoline fumes can enter heater.

Superior Manufacturing Co.
N. S., PITTSBURGH, PA.



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Compare These Prices:

Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$6.10	\$2.35	33x4	\$12.00	\$4.20
30x3	6.50	2.40	34x4	12.90	4.30
30x3 1/2	8.25	2.85	35x4	13.00	4.45
31x3 1/2	9.00	3.00	36x4	13.50	4.55
32x3 1/2	9.50	3.10	34x4 1/2	14.00	5.40
34x3 1/2	10.00	3.30	35x4 1/2	14.50	5.55
30x4	10.00		36x4 1/2	15.00	5.80
31x4	10.80	3.80	37x4 1/2	15.50	5.90
32x4	11.00	4.05	37x5	17.00	6.75

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Tires are sent subject to examination.
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now. OUR TIRES are prac-
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**Tuxedo Auto Tire Exchange, 304-A West 54th Street
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Heavy, Medium and Light
Automobile Oils

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The highest quality lowest priced lamp produced

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and when aluminum is used the wear is not so great.

Being a good conductor of heat, aluminum is more easily cooled than iron, therefore, an engine fitted with aluminum pistons will be very apt to run cooler than one fitted with iron.

Whether it would be policy for you to install aluminum pistons in a Chandler car is largely a matter of financial consideration. The cost for a six-cylinder car piston equipment, with leak proof rings and a set of wristpins will probably be about \$40, though the price varies with different makes and grades of pistons. This price, you understand, does not include the labor charge.

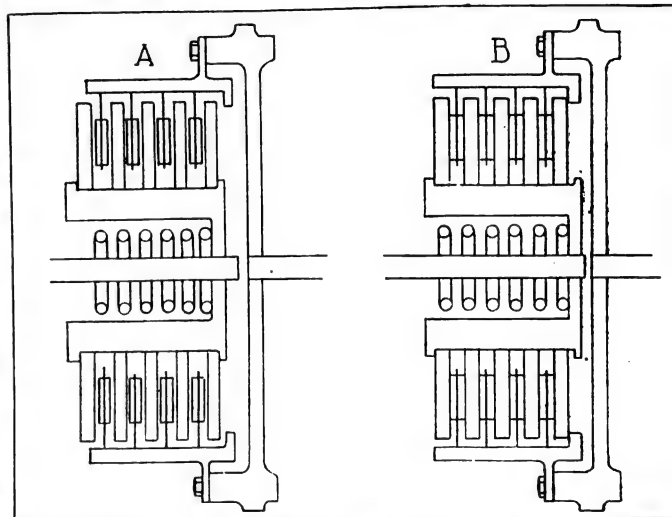
DRY DISC CLUTCH EXPLAINED.

(A. P. S., Buffalo, N. Y.)

In recent Automobile Journals there have been descriptions of Buick and Cadillac new model cars. In both cases you have referred to the clutch as being multiple dry disc. Can you give me an explanation as to how these clutches operate?

The principle entering in the construction and action of the dry disc clutches of both the Buick and Cadillac cars is the same. Dry disc clutches may be composed of any number of discs from three up.

The clutch on the Cadillac car consists of 17 discs and the eight driving discs, which are faced on both sides with asbestos friction material, are contained in a clutch ring, which is bolted to the engine flywheel.



Diagrammatic Sketch of Dry Disc Clutch: A, Clutch Disengaged; B, Clutch Engaged.

The nine driven discs are not covered with material and are carried on a clutch hub which is keyed to the transmission shaft. All of the discs are arranged to slide either together or apart.

When the clutch pedal is released the strong clutch spring compresses the disc assembly and the resulting friction of the asbestos facings against the driven plates locks them together, transmitting the power from the engine to the gearset.

The diagram attached shows how the action takes place, though the action indicated in both sketches is somewhat exaggerated. You understand, of course, that the diagrams show the parts under consideration and are simplified to make the action clear.

FORD MAIN BEARINGS.

(A. E. H., Boston, Mass.)

Is there any way that I can repair one of the main bearings of my Ford car without removing the engine block from the chassis? The babbitt seems to be all right, but there is a little play in the bearing, enough to cause a knock. There are no shims between the cap and the bearing.

The main bearings of the Ford engine are poured into place and cannot be replaced without removing the whole block and sending it to a repair shop or service station. Whether a repair is possible or not depends upon the amount

of babbitt metal left in the bearing. Remove the cap and place it in a vise. Then with a medium file scrape off a very small portion of the cap face, taking care to keep the face flat and even or the cap will not fit properly. After a little of the face has been removed try the cap into place and see if it can be tightened to take up the play in the bearing. After the cap has been filed enough so that it can be tightened against the shaft, cover the journal with Prussian blue and scrape the babbitt if necessary until a good bearing surface is obtained. Be very careful in scraping not to remove too much of the metal or you will be unable to fit the bearing properly.

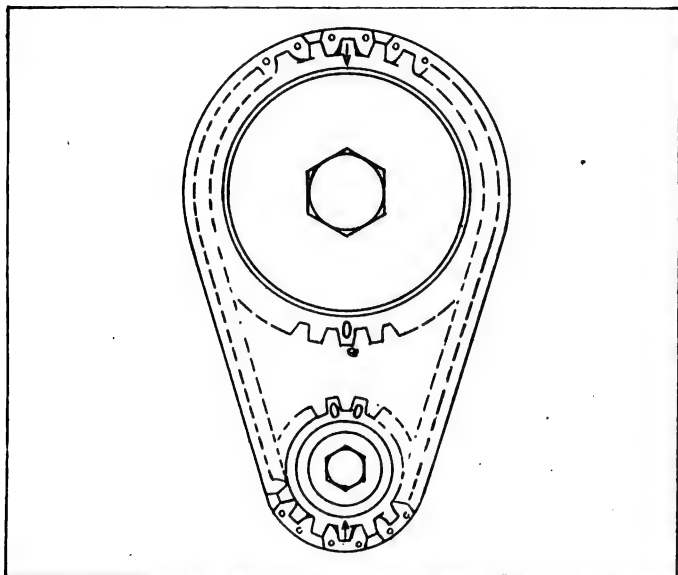
If the babbitt is very thin or badly worn the best plan will be to send the block with the crankshaft and bearings complete to a Ford service station and have all of the main bearings replaced, for if one is badly worn the other two will probably need replacing within a short time.

CADILLAC CAMSHAFT DRIVE.

(R. M., Buffalo, N. Y.)

Can you tell me how to set the crankshaft and camshaft gears on my Cadillac car (8-55) so that the valves will be timed correctly? I have both the gears and the chain off. The crankshaft sprocket is marked with two zeros and the timing gear with one.

You will find that in addition to the zero marks on the



Cadillac Timing Gear Setting.

teeth of the sprockets there are also two arrows, one on each sprocket, diametrically opposite to the zero marks.

There is but one position for the sprockets upon their respective shafts. Put them into position and turn the camshaft sprocket until the arrow points directly downward toward the centre of the crankshaft. Turn the crankshaft until the two zeros are at the top and the arrow opposite points toward the camshaft centre. When the marks are in the position indicated by the sketch herewith, replace the chain.

FORD VALVE TIMING.

(R. M., New York, N. Y.)

Will you please tell me how to set the timing gears on my Ford 1916 car? I have made a careful examination of the gears and though there is a mark on the crankshaft gear, there is no corresponding mark on the camshaft gear and I did not make one when I disassembled the engine.

Turn the crankshaft clockwise, or toward the right, until the piston in number one cylinder has traveled past top centre $1/16$ of an inch. Then turn the camshaft anti-clockwise or toward the left until the inlet valve in number one cylinder starts to open, then mesh the gears. As a check against the timing, the exhaust valve should open $5/16$ of an inch before bottom centre and close at top centre.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



WHEN the question of ignition looms up big, as it should when selecting your car, you will do well to give consideration to the record made by

BOSCH

MAGNETO IGNITION

BOSCH MAGNETO CO., 204 West 46th St., New York

Service Stations in Every State

EMCO

Automobile

OIL

The world's best petroleum refined by the most scientific method in the world's largest independent refinery.

Sold by dealers generally, or shipped anywhere by the refinery under a Money-back guarantee.

Prices and Samples on Request.



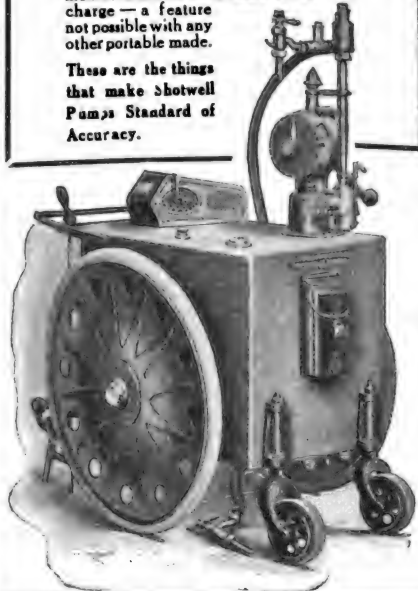
EMERY
MANUFACTURING CO.
Bradford, Pa.

Did you ever wonder how many of those machines that pass your place would stop if you had a

**SHOTWELL
Anti-Syphoning
Portable Filling Station**

Here's the outfit that has a patented anti-syphoning hose draining valve which guarantees against syphoning by the manipulation of the hose and assures accurate measurement for both hose and can. A charge — a feature not possible with any other portable made.

These are the things that make Shotwell Pumps Standard of Accuracy.



Shotwell
NEVER MORE NEVER LESS
STANDARD OF ACCURACY
CURB PUMP

WITH a continuous forward stroke, it accurately delivers clean, filtered gasoline in half the time required by return stroke pumps.

Shorter stops for your customer; more sales and larger profits for you; satisfaction for both.

Let us tell you all about it.

Shotwell Pump and Tank Company

27 North Alabama Street
INDIANAPOLIS, - INDIANA



**WINTON COMPANY INVITES SUGGESTIONS
FOR MOTOR CAR'S 20TH ANNIVERSARY.**

The Winton Company, Cleveland, O., maker of the Winton car, is seeking suggestions for a fitting celebration to be held next April to commemorate the 20th anniversary of the delivery of the first regular output of American made cars.

April 1, 1898, the Winton company began delivery of the first output of American cars, delivering 21 cars that year. The next year, 1899, 102 Wintons were delivered, including 11 trucks. Of the total of 123 cars sold in the two years, 32 went into New York state; 32 to Pennsylvania; 11 to New Jersey; nine to Ohio; seven to Connecticut; six to Illinois; five to Ontario; four to Indiana; three to Massachusetts and 14 scattering. Among the prominent pioneer motorists who purchased Winton cars during 1898 and 1899 were William Rockefeller, Harry Payne Whitney, Lawrence Waterbury, Larz Anderson, J. W. Packard, J. M. Studebaker, Henry Rogers Winthrop, C. Gray Dinsmore, Geo. W. Childs Drexel, Albert C. Bostwick, Josiah Stanford and H. K. Browning.

Not having set on any definite plans the company invites readers to suggest an appropriate celebration.

**BUSINESS IN CAR MONOGRAMS
MAKES A WONDERFUL ADVANCE.**

Every possible mark of distinctive identification a motorist can place on his car is a valuable factor in keeping it out of the hands of auto thieves and unscrupulous chauffeurs. Monograms on a car have been found to serve this purpose admirably and at the same time enhance its appearance, but owing to the time and cost of painting the monograms on by hand the practise has not been as general as it would have with a more convenient and inexpensive means. The Motorists Accessories Co., Mansfield, O., is marketing transfer letters which can be transferred to a car, motorcycle, trunk, bag or any article presenting a smooth surface. They can be put on in from 10 to 15 minutes and are not affected by mud, dust or washing. Monogramming outfits for the use of agents and

garage men, including an assortment of sizes and styles, with the tools necessary for applying them, and a standard assortment of letters and insignia will be sent. The buyer may make his own selection of characters. At a charge of 25 cents per letter put on the garage man or dealer can pick up considerable money with an outfit.

**BEARINGS SERVICE COMPANY'S PLAN
FOR THE SUPPLY OF NEW PRODUCT.**

A statement by A. K. Hebner, general manager of the Bearings Service Co., Detroit, Mich., explains the nature of the company's business in supplying new product to garage men, dealers and motorists, and shows the service quite distinctive and different from the conception of the same held by many people.

"Some people have the idea that we operate a garage and do repair work on bearings," says Mr. Hebner. "The function of our service, however, is quite different. We do no work on cars whatever, nor do we renew or regrind bearings. We act as a source of supply where garage men, automobile dealers and motorists may secure any type or size of bearings which they may need in making bearing replacements in motor cars, motor trucks or other motor vehicles. The bearings we sell are a strictly new product, shipped to us direct from the factories where they are made and we sell them under a factory guarantee.

"This service is of a more technical nature than at first glance appears, due to the fact that there are no two makes of motor cars in which the bearings are exactly alike. This necessitates our having on hand complete data covering the bearing specifications in motor cars of every make and model, as well as keeping in stock at each of our 22 branches thousands of different kinds and sizes of bearings, so that we can supply every possible demand without a moment's delay. When a garage man or motorist wants a bearing all he has to tell us is the name, year and model of the car for which it is required and the bearing location. Our detailed records then enable us to furnish the proper bearing for the installation

A

C

Spark Plugs

The Standard Spark Plug of America

Special for Ford Cars
AC CICO



7-8" Regular—for Maxwells
AC TITAN



1-2" Regular—for Studebakers
AC TITAN



1-2" Regular for Willys-Overland
AC TITAN

AC Plugs have proven to be the best under all conditions. That is why 80 manufacturers of Automobiles, Trucks, Tractors and Aeroplanes use them for regular equipment. The leading race drivers are using them. Your motor will not give its best performance unless equipped with AC. You will come to them in time. Why not buy a set now and note the improvement?

CHAMPION IGNITION CO., Flint, Michigan, U. S. A.

with absolute accuracy. These records are being added to daily by information received from the bearing manufacturers. There are, of course, other places where bearings may be obtained, but generally at these places they are sold merely "by the pound," as it were, technical information as to the proper bearing to use not being available. We render the buyer a distinct service, therefore, entirely aside from the mere act of selling.

"We maintain branches at the present time in 22 of the principal cities of the country. At each of these branches we carry in stock complete assortments of the three leading types of automobile bearings, Timken, Hyatt and New Departure. Our stocks include not only bearings of the type used in automobiles of present day manufacture, but of antiquated models and orphan cars as well. Our company being the sole service representative of the manufacturers mentioned above is naturally working in close co-operation with these manufacturers all of the time. In dealing with us, therefore, the dealer, garage man or motorist is practically dealing with the manufacturers themselves."

**CRUISER MOTOR CAR COMPANY
TO BUILD CAMPING AUTOMOBILE.**

The Cruiser Motor Car Company, recently organized with \$250,000 capital, plans the erection of a plant to manufacture a new type of convertible touring camping car. The company was organized by men of Chicago, Ill., and Madison, Wis., and it was incorporated under the laws of Wisconsin. It is expected that the factory will be ready for occupancy in 90 days.

The car, which will have a self-contained camping outfit, has many novel features, although of standard mechanical construction. It will be known as the "Cruiser" and will sell for \$1185 or \$1250 with wire wheels. Both roadster and touring type will be produced. The models have been undergoing tests during the past year and it is reported that government officials are interested in them.

The officers of the company are: President, W. D. Curtis, Madison, Wis.; vice president and general manager, Win-

throp J. Burdick; secretary, Dwight S. Bobb; treasurer, George C. Riley, Madison; sales managers, C. A. Schimberg and E. J. Haines.

"AUTO SUGGESTION" THERMITE NUMBER.

The September issue of "Auto Suggestions," the house organ of the Northwestern Chemical Co., Marietta, O., opens the fall campaign on Thermite, the company's anti-freezing solution for radiators. The general sales manager, F. R. Hall, announces through its columns that the estimated output of 300,000 gallons of Thermite for the fall trade had already been sold and a second production of 100,000 gallons is under way to meet the increased demand.

EMPIRE AUTOMOBILE COMPANY.

The Empire Automobile Co., Indianapolis, Ind., completed its eighth year in business on Sept. 1 and in each succeeding year of that time has shown a steady growth. The company never attempted production on a big quantity scale, but has adhered closely to the policy of quality first and last in production, which has been responsible for its steady and healthy expansion.

Although the year just closed witnessed the largest production of Empire models ever attempted, the company enters the new year without a single model on hand or in the warehouses. Both the four and six-cylinder Empire models are steadily gaining in popularity.

BURKE WILL SELL EVER READY PRODUCTS.

W. W. Burke has been appointed sales manager of the American Ever Ready Works, Long Island City, N. Y., and will manage the distribution of the company's new starting and lighting system for Fords. Mr. Burke is one of the pioneers in the sale of starting and lighting equipment and was formerly eastern sales manager for Gray & Davis.

FREE TOURING MAPS



**CHECK MAPS DESIRED
AND MAIL TO
GULF REFINING COMPANY
DEPT. 1870
PITTSBURGH, PA.**

<input type="checkbox"/> Middle West <input type="checkbox"/> Transcontinental <input type="checkbox"/> New England <input type="checkbox"/> New Jersey	<input type="checkbox"/> Pittsburgh-Buffalo <input type="checkbox"/> Southern States <input type="checkbox"/> Pennsylvania <input type="checkbox"/> Texas
NAME	
CITY STATE	

NEW DEPARTURE BALL BEARINGS



American Made
FOR
American Trade
**QUALITY
FIRST**



THE NEW DEPARTURE
MANUFACTURING CO.
CONRAD PATENT LICENSEES
BRISTOL, CONN., U. S. A.

CARS OF DISTINCTION. ENDURANCE. ECONOMY, COMFORT



5
Passenger
Touring Car
\$2095

Elgin Six

4
Passenger
Roadster
\$2095

ELGIN MOTOR CAR CORPORATION, 2427 So. Michigan Ave. CHICAGO, U. S. A.

\$2.00 THE YEAR

The Accessory and Garage Journal

The National Trade Authority

TIMES BUILDING, PAWTUCKET, R. I.

RESTORATION OF THE MAXWELL CAR.

(Continued from Page 14.)

put in new bearings or shafts. If either of the gears is badly worn and requires replacement, its mate also should be a new one. This is because it has been established that putting a badly worn gear with a new one produces unsatisfactory action in most cases and usually results in damage to the new gear.

Working at the Axle.

The rear axle and drive shaft may be drawn from beneath the machine after the brake rods and spring clips have been removed. A length of joist supported upon two horses will serve to support the frame and body while the work is being done on the axle.

The drive shaft tube is fastened to the axle housing by four studs; remove the nuts and the housing may be taken from the shaft. Remove the set screw which holds the roller bearing outer race in the tube and drive the shaft and bearing assembly from the tube. The pinion gear, held to the shaft by a nut, and kept from turning by a key, may be pulled from the shaft after the nut has been removed, releasing the roller and thrust bearings.

With the bearings and races in place there should be no play between the back of the pinion gear and the thrust washer. Should there be play a thicker washer should be fitted.

The upper end of the drive shaft housing should be examined and if the bearing is worn it should be replaced with new. The housing, as well as the rear axle casing, should be given a careful examination at all of the housing joints. Welding is found to be the best sort of a repair where the housings are riveted together.

Treatment of the Rear Axle Parts.

The wheels are removed by taking off the hub caps, unscrewing the shaft nuts and pulling them from the shaft with a wheel puller. When freed of the wheels the rear axle should be put across two boxes or horses. Take out the bolts at the centre of the housing and slip the two parts of the housing from the differential and shaft assembly.

Six nuts on the ends of studs fasten the two parts of the differential together. When these are removed the differential gears are exposed. The differential pinions, which are mounted on a three-point spider, should fit against the differential gears very closely and with very little lost motion.

The differential gears are held to the shafts by split rings and keys. Drive each gear back about $\frac{1}{4}$ inch, expand and remove the split ring. The gear may then be pulled from the shaft. When the differential is assembled any play may be compensated by fiber washers placed between the case and the gears.

The master or drive gear is held to the case by cap screws and seldom shows signs of wear, except in old cars. The fastening screws should be examined and if there is play or the gear is loose on the housing, the screws should be replaced with new to assure a tight fit.

Differential Support and Bearings.

The differential is supported in the axle housing and rotates upon two roller bearings. These bearings should be examined carefully and the differential tried in place for lost motion or play. The bearing outer races, if removed, should be replaced with new, as the removal usually damages them to such an extent that their usefulness is impaired.

The same statement is also true regarding the roller bearings at the outer ends of the axle. To take up the thrust of the wheels and drive the differential has a ball thrust bearing at each end. It is essential that this bearing be fully seated, or the shafts will be thrown out of line and excessive friction result.

A careful examination should be made of the brake bands and should they show signs of wear they should be replaced with new. If the facings are not worn, but are filled with oil and dirt, they may be washed with kerosene oil.

After the machine has been reassembled the axle should be raised on jacks and the brakes tried. Each wheel should be turned with the same brake setting and the friction of each band set to equalize that of the band on the opposite wheel.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

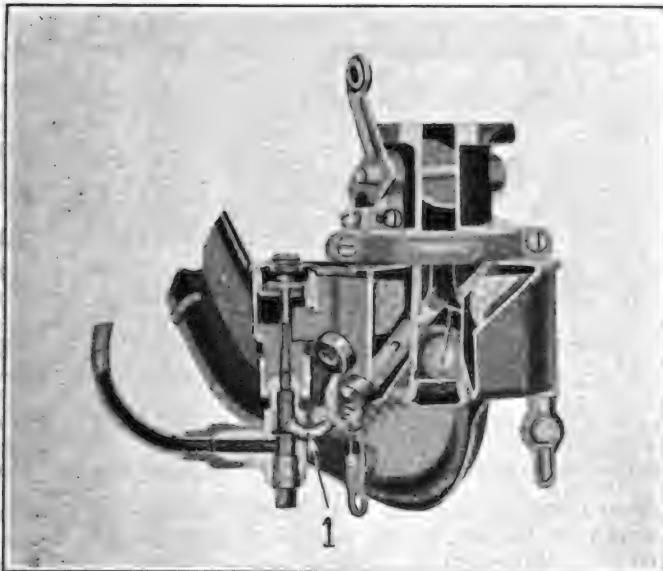
Steering Gear Examination.

The steering gear is in two parts, the upper and lower, and fastened by a coupling. The lower part, which contains the worm and worm gear, may be removed from the frame and given a careful examination. It is disassembled by removing, first, the bolt which clamps the upper part together, then by unscrewing the adjusting nut and removing it. The shaft with the worm and bearings can then be withdrawn. The worm wheel and shaft is held in place by a bearing attached to the housing by four cap screws. Upon the removal of the bearing the worm wheel may be taken out and examined.

Under ordinary conditions the total movement of the worm wheel is about 90 degrees, or one-quarter of a revolution. There are then four wheel adjustments; for as soon as one-quarter has been worn the next unworn part may be brought around. The worm adjustment is obtained by screwing down upon the nut at the top of the housing.

Fan Belt Action.

After the engine has been reassembled great care should be used to tighten the fan belt sufficiently so that it will drive the generator at its rated speed. A good check upon the fan belt action is in the current indicator upon the dash board. Under normal conditions and with the engine running at a car speed of about 15 miles per hour the current indicator will read "Charge." If it does not read "Charge" it is an



Sectional View of Carburetor: 1, Needle Valve Adjustment.

indication that the generator is not working to standard or that the wiring is at fault. A loose fan belt will occasion a slippage of the generator pulley and the generator will not be driven at the rated speed. The battery will not be kept charged under these conditions.

A wiring diagram of the electrical installation is given herewith. The numbers shown are to identify the terminals of the wires and show the connections. This diagram applies to the high-tension magneto installation. Where the Atwater-Kent ignition system is used the coil and magneto is left off, as well as the dry cells, and the wire numbered 1 in the diagram is connected with the breaker box. The secondary wires are arranged in the same order.

Timing and Adjustments.

The timing gears are marked with a punch so that the camshaft can be correctly set. The intake valves should open about six degrees after top centre and the exhaust valves will open at about 32 degrees before bottom centre.

To set the magneto turn the crankshaft over with the hand crank until the piston in number one cylinder is at the top of the explosion stroke. (Both intake and exhaust valves will be closed.) Then turn it until the piston has gone down 1/32 inch past the centre. Next retard the spark and turn the armature of the magneto until the distributor is opposite num-

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Friction starts Grinding before Grease begins Lubricating

Common grease needs heat to soften it before it can lubricate. The parts grinding together must furnish this heat in the shape of friction. Meanwhile these parts get no lubrication. And Friction—getting a good start—is *never* caught up with by grease.



Lubricates Instantly—and Always

NON-FLUID OIL lubricates the second your car moves from rest—and every minute it is in motion. Doesn't give friction a chance to start. It never melts, never leaks out, is much purer and longer lasting than any grease you can buy.

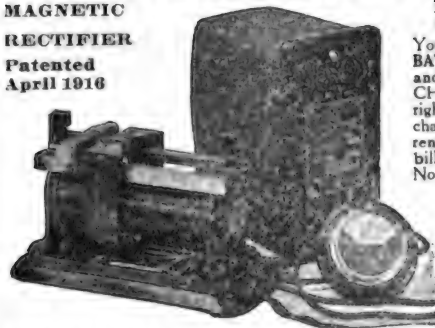
If you buy lubricants on the same basis that you buy tires—purely on service, you'll ask for NON-FLUID OIL every time. Get "K-oo Special" grade for gears; "K-ooo" grade for bearings. Sold at your dealers in orange-colored cans only.

Write for a free booklet, "Lubrication of the Motor Car."

New York & New Jersey Lubricant Company
165 Broadway New York City

F-F BATTERY BOOSTER

MAGNETIC
RECTIFIER
Patented
April 1916



NEW—FULL WAVE
HIGH EFFICIENCY
You yourself can KEEP YOUR
BATTERY FULLY CHARGED
and give it a REFORMING
CHARGE when necessary
right in the car. You save a big
charging bill and expensive
rental battery, possibly repair
bill, perhaps even a new battery.
No delay, bother or nuisance
whatever. Big profit in tak-
ing batteries in to recharge.
Operates from Lamp Socket
on 110 volt 60 cycle current

\$18 Complete, for 6
volt type.

F. O. B. Cleveland
Get Bulletin No. 15

THE FRANCE MANUFACTURING CO., Cleveland, Ohio.

Jobbers and Dealers Throughout the United States and Canada.

PAIGE

The Most Beautiful Car in America

It is a well-known fact that

Paige Dealers are among the

biggest money makers in the

motor car field. An inspec-

tion of the Paige line will explain why.

Write for complete particulars

PAIGE-DETROIT MOTOR CAR CO., Detroit, Mich.

Tarvia

PREVENTS DUST
PRESERVES ROADS

Booklets on request

The *Bonett* Company

New York, Chicago, Philadelphia, Boston, St.
Louis, Cleveland, Cincinnati, Pittsburgh, De-
troit, Birmingham, Kansas City, Minneapolis,
Nashville, Salt Lake City, Seattle, Peoria.



Hartford Equipment

Makes Every Road a Boulevard



Hartford SHOCK ABSORBER

FOR COMFORT SAFETY



Hartford AUTO JACK

Best Jack Money Can Buy



Hartford PUMP ABSORBER

AND ECONOMY The National Car Guard

EDWARD V. HARTFORD, INC.
147 Morgan St. JERSEY CITY, N. J.



ZENITH CARBURETOR

KNOWN the world over as the zenith of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U.S.A. Chicago



Ask For The Best Wrench

Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

COES WRENCH CO.
WORCESTER, MASS.



WONDER FAST

THE ORIGINAL SPRAYER POLISH

You can get it anywhere.

DIXON'S

The moment you start to run a new car Friction begins its sly work of depreciation. Tie Friction's hands and draw its teeth by using Dixon's Graphite Automobile Lubricants. Write for Booklet No. 210 G.

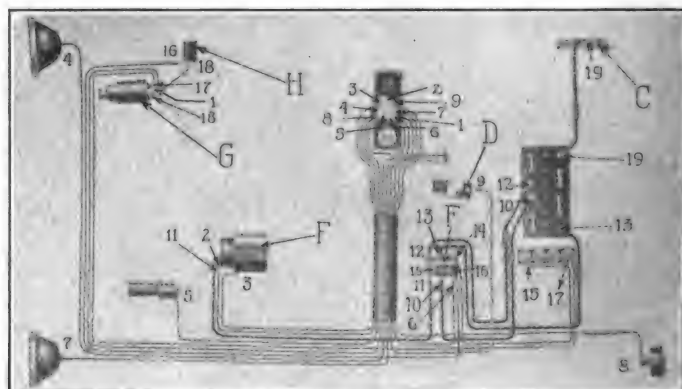
Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

ber one distributor terminal (lower left hand corner). Then move the armature either to the left or right until the points of the breaker are just separating. With the magneto in this position couple it to the engine and connect the secondary terminals from the cylinders in the following clockwise order: 1, 3, 4, 2.

The setting of the ignition system when the Atwater-Kent unit is used is as follows: Turn the piston to 1/32 inch past the centre of the firing stroke as directed in the magneto setting paragraph. Then remove the distributor cover and turn the timer coupling until the distributor arm is brought into position opposite the secondary terminal No. 1 (front right terminal). Retard the breaker and turn the timer coupling shaft by the knurled collar until the platinum points just break. With the coupling in this position turn the drive shaft until the coupling pin is opposite the notch and then couple the shafts together. The secondary wires are connected in the same clockwise order as explained above.

To adjust the carburetor first turn the needle valve to the right until it brings against its seat, then back to the left about three-quarters of a turn.

Start the engine and with the spark retarded close the throttle to an easy idling speed. After the engine has warmed up adjust the needle valve toward the right until the engine begins to slow down, indicating a weak mixture, then toward the left until the engine is running at its best. Next open the throttle two or three notches quickly, and if the engine spits or back fires turn the needle valve to the left until this is overcome. After the adjustment has been made the lock nut



Maxwell Wiring Diagram: C, Frame; D, Regulator Shunt Contact; F (Right), Starter Switch; F (Left), Motor Generator; G, Magneto; H, Ignition Coil; Numbers Refer to Terminals.

should be tightened.

To get satisfactory results from the car, it is necessary that the storage battery be kept at its highest efficiency. As has been said before the current indicator should indicate "Charge" when the car is traveling at or above 15 miles per hour, with all lights off. The indicator is the "pulse" of the electrical system and should be watched at all times. That is why it is placed in a conspicuous place. The generator is so designed as to furnish enough current for the lights and ignition, with a slight excess for the battery. By this means the battery is kept full at all times. The result of the constant charge is gassing at the battery, with a consequent loss of water, which must be compensated. Distilled water should be added to the cells regularly and at frequent intervals so as to keep the height of the electrolyte about one-quarter inch above the plates.

The electrolyte should be tested at least once every two weeks and, if the battery is fully charged, the gravity will be between 1.275 and 1.300. If the gravity reading is below 1.275 it is an indication that the battery is partially discharged and should the gravity continue to drop a thorough examination of the electrical system should be made.

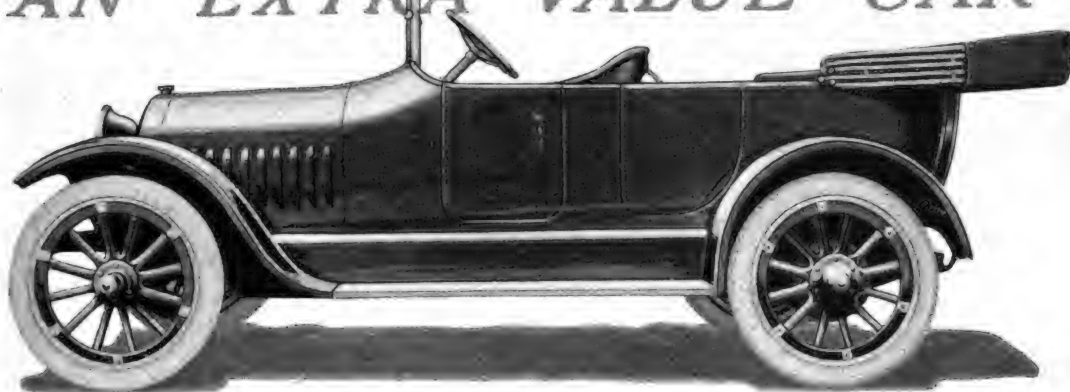
Hints on Atwater-Kent Ignition System.

Where the Atwater-Kent system is used the ignition switch must be thrown to the "Off" position while the car is stopped or continued battery discharge may result.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

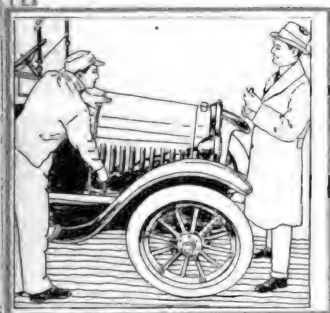
Inter-State

AN EXTRA VALUE CAR



More Proof of Value

"Everything O.K."

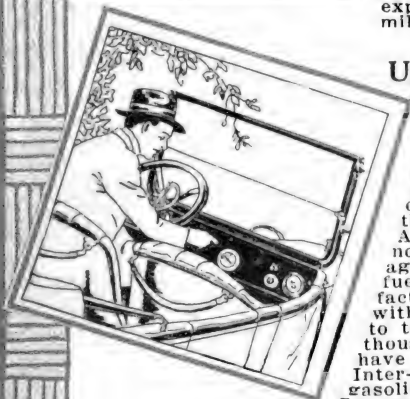


Inter-State service is always at your disposal to keep your car in shape—but it is a fact that few Inter-State owners have to call upon it. The usual verdict of the service man is—"Everything O. K."

One of the greatest value points about this "extra value" car is its ability to stay away from the repair shop.

Give it ordinary attention and care and you'll join the great army of Inter-State owners whose signed service reports last year showed an average repair expense of .00224 cents per mile.

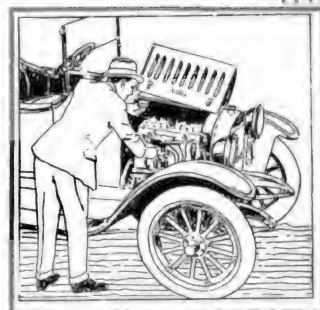
Use Less Gasoline



Right in plain sight—in the center of the instrument board—is the Inter-State gasoline gauge. Back of this gauge under the cowl is the gasoline tank, that "feeds" the valve-in-head motor. A glance at this indicator not only insures you against running out of fuel, but it also marks the fact that by comparing it with the speedometer just to the right you note what thousands of other owners have experienced, that your Inter-State does not use much gasoline.

From actual signed service reports the average mileage per gallon of gasoline among Inter-State owners is 17.27 miles.

Buy Accessibility



Inter-State accessibility is a definite factor in this car's extra value.

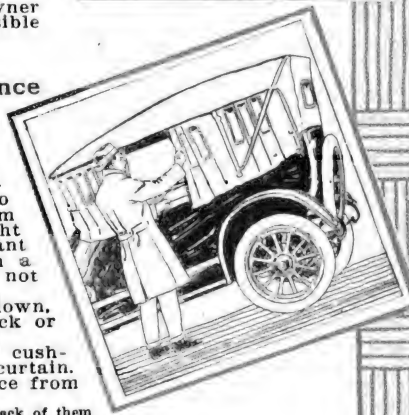
This accessibility will save you money and time. Every unit of this car is easy to get at and care for.

The simple, powerful, long-stroke, valve-in-head motor is easily adjusted and inspected by the owner. Valves, spark plugs, carburetor, oil filler, gasoline tank filler—every detail right where you can get at it quickly and easily.

Inter-State cars require little attention and we've made it easy for you to give it.

You'll be a happier owner if you buy an accessible car.

A Detail Difference



The Jiffy curtains on Inter-State cars are of real silk mohair. And after giving you the best in quality—you get more. The curtains are arranged so you can handle them quickly and easily. Right in place when you want them—stowed away in a special container when not in use.

With the top up or down, the isinglass can't crack or break. No hunting under the cushions for the right curtain. They all fasten in place from the seats.

Good materials with intelligence back of them go a long way toward giving you the utmost in value.

The reputation Inter-State has built in the past few years is due specifically to high quality materials and workmanship and the consequent satisfying performance of the cars in the hands of thousands of owners. Inter-State dealers are building a sound business on this Extra Value Car. Maybe you are in open territory. It will pay you to learn our selling and advertising plans. Better wire today.

INTER-STATE MOTOR CO.
FACTORY AND GENERAL OFFICES, MUNCIE, IND.



Polarine

The Standard Oil for all Motors

NEITHER the heat of summer nor the cold of winter affects its efficiency. It is immune to changes of temperature. Flows at zero; yet holds its body under severe conditions of heat and pressure.

Polarine minimizes friction, saves gasoline, and keeps all the power turning the shaft.

The SOCONY Sign—your safeguard—leads the way to Polarine and SOCONY Motor Gasoline—the best.

STANDARD OIL COMPANY OF NEW YORK

NEW YORK
BUFFALO

Principal Offices

ALBANY
BOSTON



AUTOMOBILE JOURNAL

10 cents the copy

PAWTUCKET, R. I.

\$1.50 the year

VOL. LXIV.

SEPTEMBER 25, 1917.

NO. 4.



What Is Your Car Tool Equipment?

WRENCHES that do not fit or are defective are costly, either in the car, garage or shop, for their use means poor work, loss of time and labor, and added expense. No car is well equipped if the tools are not chosen for the work done on it.

You require tools that will fit any nut or bolt on the car from any angle or position. Examine your kit and replace all defective wrenches at the nearest dealer, where you can select from WALDEN-WORCESTER display boards or cabinets what will exactly meet your needs.

WALDEN-WORCESTER wrenches are not more expensive than inferior unguaranteed tools. Your dealer will recommend and guarantee what are used by all expert automobile repairers.

Every owner has need of a copy of our latest catalogue, illustrating, describing and pricing WALDEN-WORCESTER wrenches. Send for it today.

WALDEN-WORCESTER
INCORPORATED
WORCESTER, MASS.

The Most Reliable—and These Manufacturers Know It—and Equip Their Cars With **AC** Spark Plugs

Cadillac
Pierce-Arrow
Packard
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Hudson
Chalmers
Hupmobile
Chandler
Haynes
Chevrolet
Dort
Cole
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Pilot
Abbott
Pathfinder
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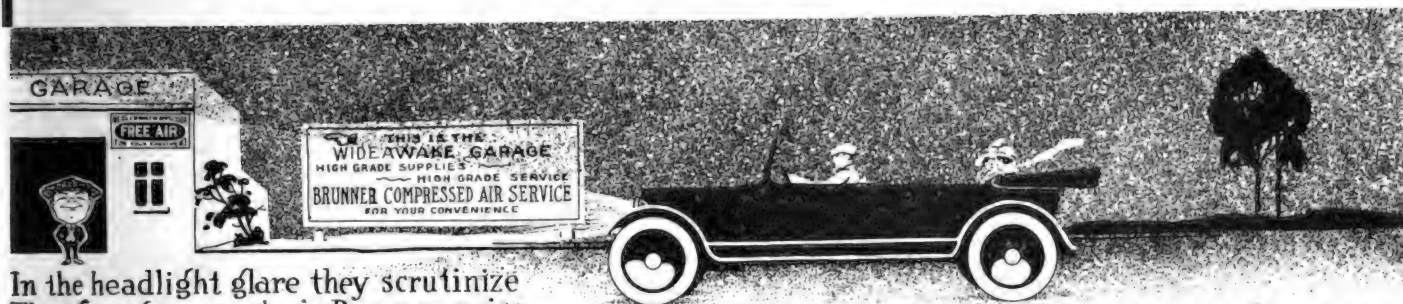
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And stop for air and — some supplies.

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And any one of the high-class reputable jobbing houses who distribute the Brunner Line will be glad to recommend and guarantee a Brunner outfit to meet your special requirements. We will be glad to send you the name of the Brunner Jobber covering your town, and our engineers will be very glad to assist you in making your compressed air service—a service that satisfies.

Our No. 14 Catalog and Garageman's Handbook on Compressed Air are yours for the asking. Write for these books today and get the facts regarding the Garage Air Compressor situation.

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\$7.50

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1763 Broadway, New York

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Are made for a number of light cars, including

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Let us quote you prices. They will mean profits, no matter how large or small the order

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The Perfect, Practical, Positive Brake For Ford Cars

NOT ONLY MAKES YOU FEEL SAFE, BUT ASSURES YOUR SAFETY

HOLD FORD BRAKES are high-grade external contracting brakes for Ford cars, which can be easily and quickly installed to act from the hand lever as emergency brakes, or from the foot pedal as service brakes. Designed in accordance with the best engineering practice; the band and brace are of steel, the toggle crank and bracket are drop forgings and the lining J-M non-burn. Do not drag when released, no readjustment for wear is necessary and oiling is easy.

The brake usually supplied with this car cannot be depended upon in that "tight corner" or "on the hill." The hand brake wears out quickly and allows the car to creep when being cranked. The constant use of the foot brake quickly wears out the transmission. As the foot brake operates from the drive shaft any accident to the axle or the stripping of gears might mean a serious accident.

HOLD FORD BRAKES save wear and tear and will be attached by the wise owner on his pleasure car, delivery car or truck. They will positively stop a Ford with locked wheels on any grade, at any speed, with any load. Not necessary to remove old brakes. (When ordering state whether hand or foot brakes are wanted).

THE G. H. DYER COMPANY - - - **Cambridge, Mass.**

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Cork Inserts Stop the Slip



\$3

for set
of 3

**Outwear
other
linings
3 to
1**

ADVANCE

CORK INSERT

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TRANSMISSION LININGS FOR FORDS

They Stop the FORD Jarring and Chattering

***They make the Ford Brake BRAKE!
They outlast 3 sets of ordinary linings***

When Cork Insert Transmission Linings go on a car, smooth, positive, quiet transmission action begins. They end those noisy, chattering stops with the car shaking like a tree in a gale. They stop those jarry, jumpy get-aways. They eliminate those lurchy reverses.

Here's why: the jumping, chattering, lurching, is caused by faulty transmission linings. Ordinary transmission linings soon get hard and smooth in service. Then they slip when brought into use. That grabbing and slipping causes all the jerking, sets up the noisy chattering, makes the braking action uncertain and slowly but surely junks the car.

Cork Insert Transmission Linings eliminate the slipping—the rattling—the jerking. The corks never get hard or slippery. They give a better driving, better braking car and a lining that greatly outwears ordinary lining.

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Dept. 131 56 East Randolph St., Chicago

Keeps the Motor Cool by keeping the Fan Fanning

Overheating—that's the biggest bugaboo in motoring. Overheating is largely avoided if the fan can be kept fanning by a belt that don't slip. The slippage of the ordinary Ford fan belt runs as high as 25% to 50%.

Cork Insert Fan Belts don't slip. The buttons of cork—unaffected by water or oil, grease or dirt—grip at the first turn of the motor and keep the fan fanning. They outwear several ordinary fan belts, and do the work better as long as they last.

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FAN BELT FOR FORDS

\$1
for
1917
FORD

**All Earlier
Models 85 cents**

Order From Your Jobber

Order at least a dozen sets of Cork Inserts next time your jobber's salesman drops in. Cork Inserts mean better profit for you — better service and satisfaction for the user. They are the liveliest line in the field. Strongly advertised. Your customers know about them. Stock them and they'll move fast. Send coupon if your jobber can't supply you, and get started selling them.

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 [Regular dealer discounts to apply.]

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☐ City..... State.....
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AUTOMOBILE JOURNAL

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Ten Cents
a Copy

VOL. LXIV. SEPT. 25, 1917. NO. 4.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and 25th of each month by the

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Times Building, Pawtucket, R. I.

FURTHER exploitation of the service values to be found in new cars and used cars continues the aim of the Automobile Journal in the midst of conditions brought forward by the war. This magazine was the first and only publication to declare and prove repeatedly that a set price on a used car based on its model and year of manufacture is impossible of maintenance, as well as a detriment to every interest in the trade. The application of service principles in the handling of used cars is growing. Thus the automobile industry is making a real business of the used car business and not allowing it to drift and become more complex year after year. Money back clauses used with success in contracts on a resale guarantee that a car may be returned to the dealer within seven days from date of delivery and the purchase price be refunded provided that the car has not been in an accident, tampered with or misused, and is in as good condition as when delivered, except for ordinary wear and tear. Very few of the used cars thus sold come back, because the dealer has first made sure the car is right, the customer is inspired with confidence that it is right, and on trial it is found right.

THE practicalities of the chassis conversion unit presents attractions to owners who are seeking use for the remaining values in their cars after they have served a period in the ordinary services as a passenger vehicle. This outlet for used cars, as followed up by many progressive dealers, proves not only a source of profit but promotes the sale of extra new cars. A very informative article on chassis conversion units leads this issue of the magazine as a contribution to the campaign of education designed to obtain a proper recognition of the values of used cars.

IF a group of inventors and experts in mechanisms can pool their various talents and invent the very best aeroplane motor in the world, some other group of applied scientists should be able to develop an entirely practicable alcohol engine and thereby reduce the demand for gasoline. All motor-dom is interested in the Liberty motor for aeroplanes, announced as perfected at the very low total weight of one and three-quarters pounds per horsepower. Next for solution is the subject of engine fuel. The adaptation of alcohol to this problem challenges American inventive genius. The matter is not a new one. The alcohol engine is a fact. But it has not received much attention. We have vast supplies of petroleum, but the enormous multiplication of automobiles and of stationary gas engines, would, without war or navies, create the need of supplementing a mineral resource which is capable of exhaustion. The war is likely to end next year, or, at the furthest, the year after, but the supplies of coal and mineral oil may become exhausted. The demand for motive power is always increasing, and increasing faster than the population. The material for alcohol for fuel can be produced in any quantity every year, not only from grain and vegetable crops, but the government itself has shown, according to reports of the Forest Products laboratories that it can be produced from sawdust. Fame, fortune and blessings of 4,000,000 motorists await the ingenious persons who can perfect the alcohol engine.

OTHER features of this splendid early fall issue include timely and extensive fashion pages, superbly illustrated, a full account of the greatest speedway event of the year, the Sheephead Bay handican and the used car overhaul of the Studebaker Four and Six.

1917 SALES

FOREIGN BUSINESS \$90,958,243.00

From National Automobile Chamber of Commerce,
7 East 42nd Street, New York, August 27, 1917

Embargoes Affect Motor Car Exports

Thirty-five Per Cent. Decrease in Shipments to Great Britain, France and Russia During Last Fiscal Year—Big Increases to All Other Countries—Shipments Total 80,811 Cars, Valued at \$90,958,243—Thirty-three Hundred More Vehicles Exported, But Aggregate Value is \$6,507,000 Less—Fewer Trucks and More Passenger Cars.

Figures just issued by the Department of Commerce show that during the 12 months ended June 30, 1917, the United States exported 80,811 automobiles and motor trucks, valued at \$90,958,243, as compared with 77,499 cars, valued at \$97,465,811 during the preceding fiscal year.

Analyzing the official figures, the National Automobile Chamber of Commerce finds that the increase in number of cars exported is due to the larger shipments to most countries outside of Europe, which more than offset the decreases in exports to Great Britain, France and Russia, due to import prohibitions and lack of shipping facilities.

The fact that the aggregate value of exports during the last fiscal year was less by \$6,507,000 than in the preceding year, while the actual number of vehicles exported was greater by 3312, is due to decreased shipments of trucks for war purposes, the average value of which is much higher than the average value of passenger cars exported to countries outside of Europe.

Exports of commercial vehicles and passenger cars during the two years were as follows:

	1916		1917	
	No.	Value	No.	Value
Commercial....	21,265	\$56,805,548	15,977	\$42,337,315
Passenger.....	56,234	40,660,263	64,834	48,620,928

Thus, while the number of trucks exported fell off 5288 in the year and their aggregate value was \$14,468,233 less, the shipments of passenger cars increased by 8600 and their value by \$7,960,665.

Great Britain and France were still our largest markets, despite their heavy falling off in purchases. The former bought \$18,508,442 worth last year, mostly trucks, as against \$26,147,232 worth in the previous fiscal year. France's imports were nearly all trucks and amounted to \$14,691,460, as compared with \$19,137,904 in the 12 months ended June 30, 1916.

Owing to shipping difficulties and internal political

troubles, Russia's imports fell from a value of \$15,686,874 in 1916 to \$6,371,982 in the last fiscal year.

Exports to the rest of Europe combined increased remarkably, when it is remembered that no shipments went to the central empires. The increase amounted to more than \$1,000,000 in the year, accounted for largely by exports to the Scandinavian countries, Holland and Spain. Europe as a whole took slightly less than one-third by valuation of the total American exports.

Aside from the European countries, Canada is America's best customer for motor cars, having increased her purchases by nearly \$4,200,000—from \$7,280,151 in 1916 to \$12,088,787 in 1917.

Next comes Asia and Oceania, with imports of 9716 cars, valued at \$10,093,720 last year—an increase of \$1,450,927. Australia follows, with 5000, valued at \$4,213,874. The British East Indies increased their purchases from \$2,307,739 to \$3,617,351.

In the Americas, after Canada, the West Indies were our best market for automobiles, to the extent of \$4,072,647—an increase of \$1,248,735 over the year before.

The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workmen.

If you are a member of the Foreign Trade Bureau conducted by the Automobile Journal Publishing Company you can reach 8,000 foreign buyers of pleasure cars, trucks, fittings, supplies, accessories, tools and equipment in more than 81 foreign countries.

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Sizes 1"–6"

or

25 mms to 150 mms

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without velvet lined
leather cases.



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To keep the quality of your repair work up to the high standard of the original construction you should employ the *standard* measuring instruments.

In the automobile industry the recognized standard for quality and accuracy is

TRADE MARK
Starrett Tools
REG. U.S. PAT. OFF.

A good equipment for service stations and garages includes Starrett micrometers of various sizes, height and depth gages, surface gages, thread gages, calipers and dividers, etc.

Starrett Hack Saws are suited to every kind of metal cutting.

Write for free catalog No. 21 GT describing 2100 styles and sizes of measuring instruments and hack saws.

For sale at good hardware stores.



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World's Greatest Toolmakers

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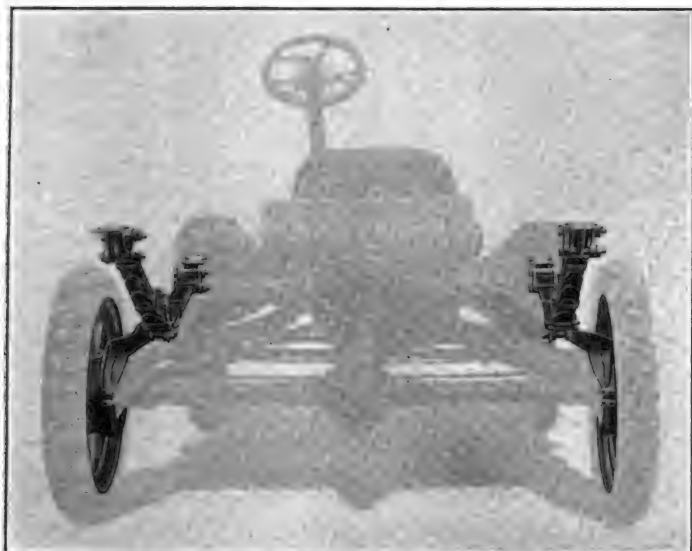


THE Automobile Journal

VOL. XLIV.

SEPTEMBER 25, 1917.

NO. 4.



Phantom of the Rear of a Ford Chassis Showing Spring Suspension When Converted with the Olson Unit.

THE Automobile Journal maintains that the car owner is not compelled to take the valuation assessed on his car by set price lists favored by any individual, association or publication. In accordance with this view, which has been treated in various phases in preceding numbers, we are presenting in this issue a very practical article on the subject of chassis conversion units. This collation of data on the appliances and methods by which cars may be converted in various ways to the commercial uses of an owner simply goes to show that the excellent values built into

on value remaining in a car after it has passed a period of a few months, a year, or longer, in the lines of passenger carrying for which it was originally designed. In these times, if ever, conservation of car values is a pressing question.

Utility values for deliveries, light, medium and heavy haulage, are by no means the full measure of the remaining value in a car. Commercial value is, however, a strong value, depending, of course,

modern cars are adaptable without the necessity of submitting to loss

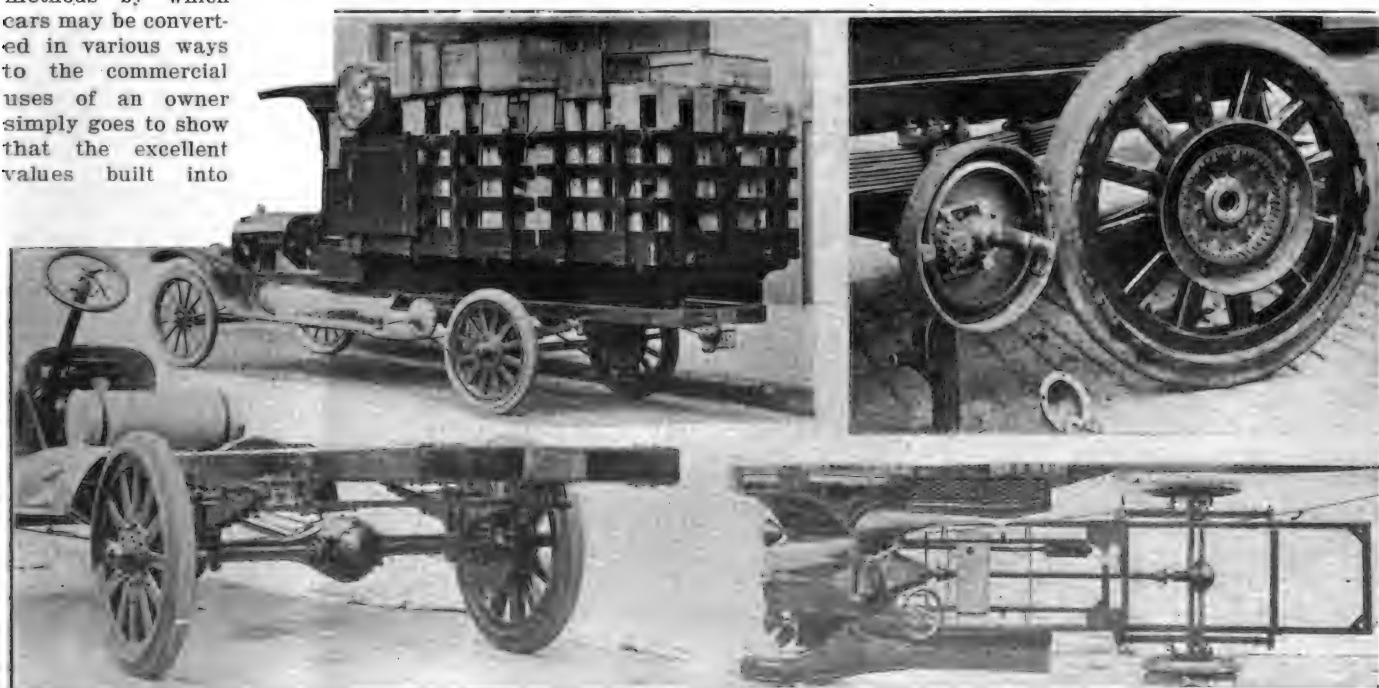
upon frame and chassis design and the condition of the car.

The advantages in such a trade are readily apparent. When a car is to be converted the dealer, for example, is in a position to be doubly benefited. He is relieved from the necessity of taking the used car and finding a new customer for it, while there is also presented an avenue for profit on the sale of a haulage unit. Advantages also trace themselves readily to the maker and consumer.

Because they have such a decided community of interest, therefore, in the solution of the used car problem, the atten-

How Conversion Units Reclaim Used Cars For Commercial Tasks

Remaining Values in Thousands of Automobiles Preserved and Directed to Those Pressing Haulage Services Which Arise in These Stressful Times of War Economies



Views of the Tonford Conversion Unit: Upper Left Shows Ford Chassis Fitted with a Light Stake Platform Body; Upper Right, Showing Construction of the Internal Gear Mechanism; Lower Left, Rear of Converted Chassis Showing Frame, Spring Suspension and Rear Axle; Lower Right, Plan View of Chassis Ready to Take the Body.



Express Loaded on a Converted Ford Car Equipped with a Guaranty Internal Gear Driven Unit.

tion of the owner, the dealer and the manufacturer is respectfully directed to the following pages for the undoubted benefit it will confer on each.

There are many business men who, when planning to purchase a new automobile, do not give proper consideration to the value and profit that their old machine will show if turned into a commercial vehicle to displace their horses or increase the service they already have, instead of offering it to a dealer to secure an allowance on a new model.

Many men while progressive in many respects are frequently lacking in putting into effect all time and money saving methods in their business, while for pleasure they would not want any one to consider them behind the times. This inclination, coupled with lack of information as manifested by many, is due more to the lack of knowledge on the part of these men, a fact which, perhaps, holds many back from a pursuit of this course. Otherwise it is hard to understand why there are not more business men taking advantage of the opportunity present today in providing a cheap and efficient means of transportation in their business by utilizing the thousands of available used cars in the market and the truck forming attachments that are sold by so many different manufacturers. No at-

tempt is made in the following compilations to include the opportunities presented in farm tractors and many forms of road traction, as they practically form classes by themselves.

During the past few weeks there has been a marked strengthening in the mar-

many instances as on original sale.

Should such a situation develop here it may be many months before the business man can again avail himself of opportunities so advantageous in providing transportation or haulage means as he can under existing conditions. The so-called used car, unless it has been severely abused or driven in excess of 50,000 miles, still has many thousands of miles of service and latent strength built into it and the only reason that it suffers in market value is that its appearance, model or shape does not meet with its owner's approval.

Many business men still need to be made aware that there are efficient and practical units sold, which at slight cost will transform the average passenger car chassis into a durable delivery wagon, capable of doing the work of several horse drawn vehicles and at a much less cost. The majority of these truck forming units are designed for Ford chassis, but they are also made for heavier cars and some are designed to convert the heavier sized passenger car chassis into fairly heavy haulage vehicles.

Practically all of these attachments are



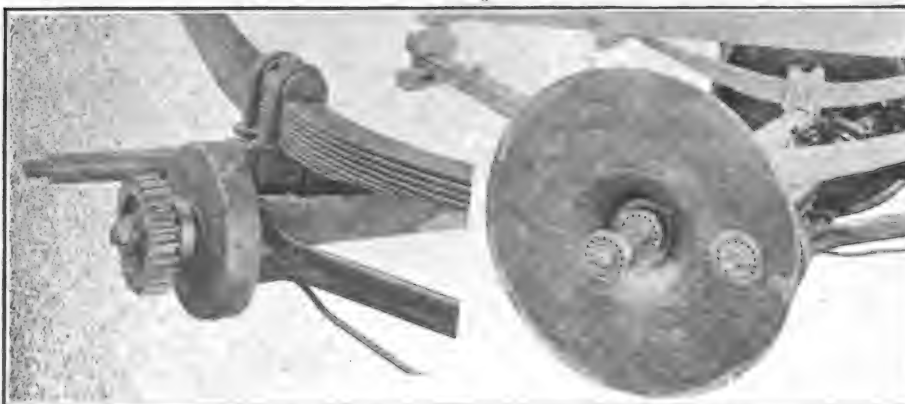
Chassis with Eastern Truckford Conversion Unit Fitted with an Enclosed Panel Body for Delivery Work.

ket for used cars, which is taken as indicating the same trend of conditions that materialized in England under war conditions, where through the lowered production of commercial vehicles and passenger cars, used cars soon commanded as much money second hand in

comparatively simple in construction and do not require any special skill in adapting them to the passenger car chassis, or require more than ordinary care for maintenance and operation.

Obviously, therefore, in many cases the business man who is about to turn his road or family car in for a new one, should stop to consider the possibilities of using it in his business, as by so doing he would sustain less loss on his original investment and in all probability provide his business with equipment that would show a saving in his haulage costs, as well as establish it upon a more up-to-date basis. If he knows nothing of these conversion units he should call on one of the many dealers who sell them and have its economy and efficiency explained. He will undoubtedly be told of many users of this form of commercial vehicle and will be enabled to interview them so that he can become convinced that the proposition is one that should be adopted.

Thousands of marketers, peddlers, plumbers, carpenters, dry goods men, and, in fact, every kind of merchant who has goods to deliver are using these ve-

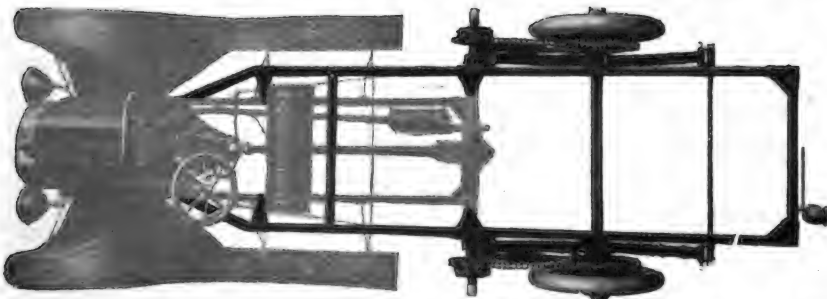


Make-A-Motor Truck Internal Gear Axle: At Left, the Ford Axle Converted to a Jackshaft, with the Drive Pinion, Brake Drum and Rear Axle Spindle; at Right, the Axle End, Showing the Flange Carrying the Jackshaft Pinion and the Jackshaft in a Ball Bearing and the Roller Bearings on the Axle Spindle.

hicles made of used car chassis and truck forming attachments, and the increasing sales of the units indicate their great popularity and service. Hundreds of suburban fire departments are so equipped and farmers throughout the country come to market with their produce in these vehicles, some of which are so adapted that they can in short notice be reconverted to their original purposes.

Numerous styles and types of truck forming attachments are explained from data in hand in the following pages to show that they are, the ease with which they may be attached, the strength and simplicity of their construction and the many branches of haulage and delivery work in which they may be utilized.

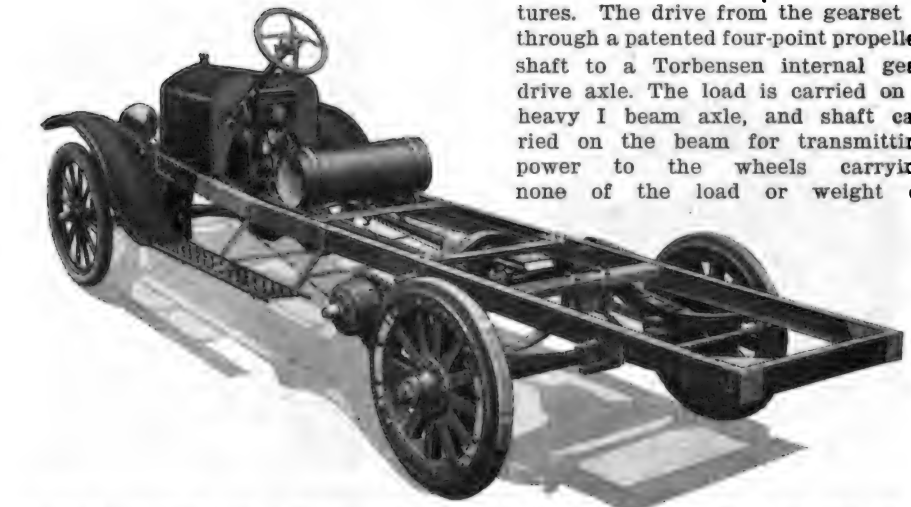
OLSON—The Olson truck is made of a Ford chassis assembled with an Olson unit. The Olson unit, which was one of the first in the field, having been exhibited in 1915 at the Michigan State Fair at Detroit, is a scientifically designed device for converting the chassis of the Ford passenger car into a commercial vehicle with capacities of from 1000 to 2000 pounds, according to the type of attachment used. Thousands of Olson units are in service in this country and abroad and the proof of their serviceability is



Eastern Truckford Conversion Unit Shown in the Solid Part of Drawing Representing Plan View of Chassis.

found in the wide sale they have enjoyed. This unit takes the load from the Ford axle and places it on the housings of the wheels in which bearings are mounted that fit in the axle housing, the axle being converted from semi-floating practically to full floating. This arrangement permits the energy of the motor to be transmitted to the wheels without putting the friction from the load strain upon the transmission and differential. Ford chassis with the Olson unit have covered as high as 18 miles to the gallon of gasoline with full loads. The Olson unit is manufactured by the Swedish Crucible Steel Co., Detroit, Mich., and Windsor, Ont.

TONFORD TRUCK UNITS—Both a chain drive and internal gear drive unit are manufactured by the Detroit Truck Co., Detroit, Mich., and marketed under the name of "Tonford." In the internal gear drive unit a Torbensen rear axle is employed, the load being carried on a dead I section axle, to which a jackshaft is secured, the ends of the jackshaft housing being carried by the brake flanges. The drive is from the jackshaft pinions to internal ring gears on the wheels, and the pinions and gears are thoroughly enclosed and lubricated with



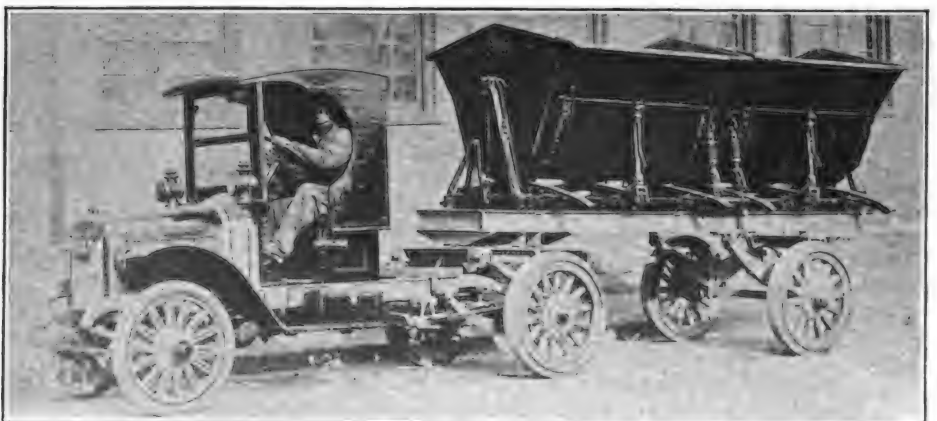
Chassis Converted with a Maxfer Unit, Assembled and in Readiness for the Installation of a Body.

grease. In this construction the driving shaft has to be extended and to obviate whipping an SKF self-aligning bearing is fitted in the extension. The chain driven Tonford unit has a sprocket which fits on the rear axle of the Ford chassis and permits the use of the same tread in front as in the rear. This sprocket is of distinctive design, being split so that it

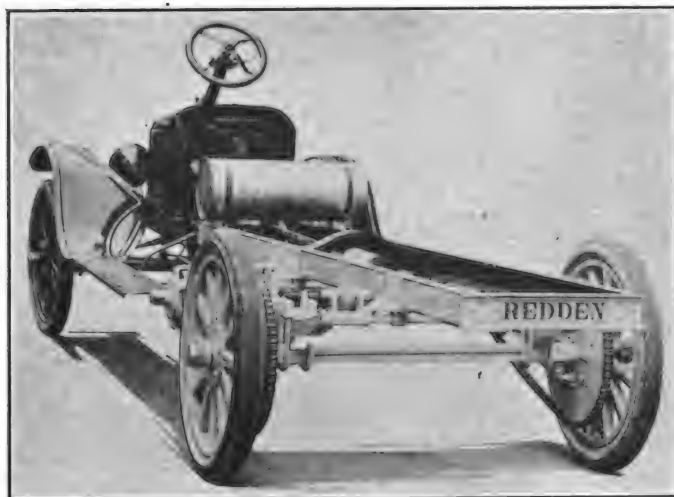
tures. The drive from the gearset is through a patented four-point propeller shaft to a Torbensen internal gear drive axle. The load is carried on a heavy I beam axle, and shaft carried on the beam for transmitting power to the wheels carrying none of the load or weight of

the car. The I beam axle is guaranteed for the life of the car and the internal gears for two years. Another feature of strength and stability is found in the springs, the one-ton unit having springs of 12 leaves and the two-ton unit 15 leaves. Overhung type of spring shackles are used so that even in a case of the truck being overloaded and the springs deflected to the limit, the frame cannot hit the spring shackles. The frame is made of heavy pressed steel channel section, strongly gusseted at the corners and riveted throughout. On the Ford chassis the frame completely encloses the old one and when used with other chassis the junction of the frames is electrically welded. Guaranty attachments are designed to meet a wide line of service, being made in three different wheelbase lengths, 112, 124 and 136 inches.

EASTERN TRUCKFORD CHAIN DRIVES—The Eastern Truckford chain drive unit, with a capacity of 3000 pounds, is made by the Eastern Truckford Co., Inc., Buffalo, N. Y. In adapting the attachment to the Ford chassis the latter is little altered and can be used again for passenger car service at short notice. A bell sprocket fits onto the ends of the Ford axle using the old bearings and keyways. Heavy, flexible springs are used, 48x2½, and the wheels are of extra



Automobile Chassis, Knox Unit and Semi-Trailer with a Lee Two-Way Unloading Body, Suitable for Hauling Loose Materials.



Rear of a Redden C conversion Unit and Chassis Forming a Very Practical Light Truck.

heavy construction with Timken bearings and are fitted with solid 32x3½ tires. The wheelbase is 128 inches.

MAXFER UNITS—The Maxfer ton-truck-maker, manufactured by the Maxfer Truck and Tractor Co., Chicago, Ill., is a conversion unit costing \$350 and designed to fit a Ford, Maxwell or Chevrolet chassis. An offset bell sprocket attached to the Ford rear axle with a chain, transmits the power to new large rear sprockets that serve to both reduce the speed and conserve the energy. The original rear axle is used solely for carrying the sprockets and transmitting the power and carries no weight. The truck wheels are of the artillery type, made of second growth of hickory and run on heavy roller bearings guaranteed to 7000 pounds. The axle of the attachment is of the heavy truck type, 2¼x1¼ inches. The springs are of carbon steel 10 leaf, two inches wide and 42 inches long, half elliptic, with an extra centre relief spring to insure against overloading. Seamless steel tubes are used as bushings in the side springs. The frame is 4x13/16 inch channel steel heavily reinforced by four cross members of the same material, with gusset plates at the rear corners. In addition to this unit the company also makes a Maxfer two-ton conversion unit for Buick, Overland and Dodge chassis, which sells for \$410, including changes.

MAKE-A-MOTOR TRUCK ATTACHMENTS—The Make-A-Motor truck attachment, made by the Make-A-Motor Truck Co., Chicago, Ill., has a distinctive type of drive, embodying many features not found in any other conversion units. The drive, which is patented and used exclusively by this company, is through spur gears contained in a cast wheel. The gears are guaranteed for 50,000 miles and the wheel is so constructed that they will hold from six to eight pounds of mica axle grease, giving lubrication to the moving parts for six months without replenishment. A cast steel spreader disc fits on the inside of the wheel, protecting the gears from sand and other matter. The spreader disc is solid on a four-inch steel axle of I beam section, and the latter is fitted with a

four inch deep, with gusset plates riveted top and bottom at the rear and at the union of the cross members. The springs, which are guaranteed indefinitely against centre breakage, and for one year against breakage at the ends, are of the titanic type, 48 inches long by 2¼ inches wide. No centre bolt is used and the brackets are of crucible steel and so constructed that in the event of the shackle bolt breaking the spring is not released.

KNOX TRACTION UNITS—The Knox traction units, made by the Knox Motors Associates, Springfield, Mass., are in a class distinctly by themselves, being designed on individual lines and serving to convert the chassis of a passenger car into a tractor for hauling trailers with two, three or five-ton capacities. To attach the Knox units the body back of the driver's seat is removed from the chassis, together with the rear axle, springs and radius rods, and a transverse channel member of the unit is slid over the top of the stripped passenger car frame, clamped down and bolted into place. At the outer end of the drive pinion shaft is a special diameter flange, which is left blank to be drilled to match the flange on the rear universal joint of the car to which the unit is to be attached. The internal gear driven axle is built up of a solid or dead axle carrying on roller bearings wheels fitted with solid rubber tires. Bolted onto these wheels are the brake drums and the internal gear driving gears, and forward of the dead axle there is a housing carrying the differential gear with its bevel drive gear

ball bearing for the support of the Ford shaft, on which is keyed a small bearing pinion that carries the driving gear. Between the Ford transmission and the front end of the Ford drive shaft a splined extension, 18 inches long, with two universal joints, is used, leaving the Ford drive shaft and axle in full floating condition. The frame is made of 20-gauge hot rolled steel channel with triple braces. It is 16½ inches long by 32 inches wide and

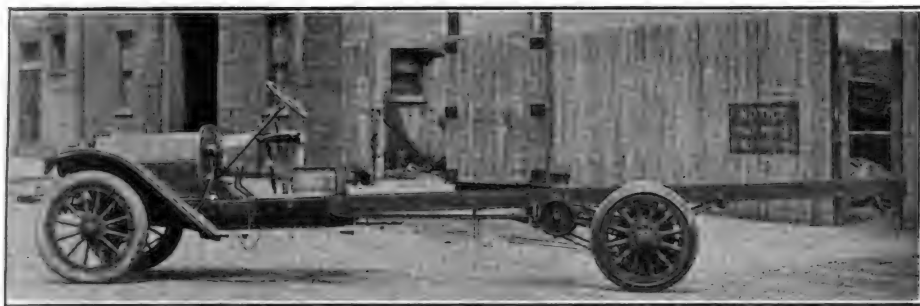
and pinion. Extending outward from this gear are the two jackshafts which carry the drive pinion at their outer ends. After the foot brake rods are connected up with the outside contracting brake and the emergency brake rods are connected with the internal expanding brake, the tractor is ready for use. The prices of the Knox units range from \$390 to \$750, according to capacity.

REDDEN TRUCK-MAKER—The Redden Motor Truck Co., Inc., Chicago, Ill., manufacture the Redden Truck-Maker, which can be used with either Ford, Maxwell or other makes of passenger car chassis to make a commercial vehicle of one-ton capacity. The attachment has a four-inch rolled steel channel frame extending eight feet eight inches back of the driver's seat, which will carry a body of nine or 10 feet of loading space. The frame telescopes on the Ford frame and is bolted, making a cap weld. In adapting it it is not necessary to cut the old rear axle or housing, the Ford rear axle being used as a jackshaft. The attachment axle is of steel, 2¼ inches square, with heavy duty adjustable radius rods and Bower roller bearings. The springs are of the semi-elliptic type, 2½ inches wide and 40 inches long, with eight leaves and double shackle bars. The wheels are of the heavy artillery type to S. A. E. standard, 34x3½ inches. The tires are solid rubber and the tread is standard 56-inch. The gear ratio is seven to one, with heavy roller type chains, 1x½x¾. The castings are all steel and the construction is ample to handle considerable overload.

ROYAL CONVERSION UNITS—The Wallace C. Hood Service Bureau, Detroit, Mich., is the sole selling agency for the Royal conversion unit, which is manufactured by the Royal Motors Corporation of that city. This unit, which sells for \$350 complete, ready to be attached, is to a considerable extent standardized. In assembling it with the Ford chassis the latter is not changed or the rear axle



Rear View of a Ford Chassis After Conversion with a Royal Unit of the Chain Drive Type.



Dearborn One-Ton Unit Adapted with a Buick Chassis, Making Splendid Vehicle for Light Haulage.

cut. It can be disassembled on short notice and the Ford used as a passenger car again. The frame is of reinforced pressed steel which overlaps and extends into the Ford frame, forming a sub-frame for the truck body. The rear axle is round, of high carbon steel, two inches in diameter, and tested to 2½ tons. The drive is through Culver-Taylor chains from the sprocket on the Ford axle to the new rear axle sprockets. The side springs are 2½x48 inches, with 12 leaves. There is also a rear spring 2½x36 inches, with five leaves, which takes the vibration and carries the load when less than 500 pounds is being hauled. Above that weight the lengthwise springs take the load. The tires are Firestone solids, 32x4 inches. The wheelbase is 135 inches and the tread 56 inches. The unit weighs 876 pounds net and has a capacity of 1½ tons.

DEARBORN UNITS—The Dearborn Truck Co., Chicago, Ill., make two sizes of conversion units, a one-ton and a two-ton unit, which are adaptable to Ford, Buick, Maxwell, Dodge, Overland, Studebaker, Hupmobile, Chandler, Pierce-Arrow, Apperson, Peerless, Packard, Locomobile, Lozier, Oldsmobile, Chalmers, Hudson and a number of other chassis. The first Dearborn units were for Ford chassis. The heavier units recently introduced, while following out the original design, are constructed of heavier parts. The frame is five-inch steel channel, and the dead axle is 2½x2 inches, drop forged of heat treated steel. The axle is mounted on heavy three-inch springs, 48 inches long, with nine leaves and bronze bushings in the eyes. An additional relief spring is located over the axle. The wheels are 34x5 inches and the chains are the Baldwin roller type running on 1¼ pitch steel sprockets. The body has a loading space of 10 feet.

TON-A-FORD UNIT—The Ton-A-Ford Unit, made by the Ton-A-Ford Truck Co., Racine, Wis., particularly appeals to the man who wants to use his car for pleasure as well as business purposes, as it is so constructed that it can be quickly and readily detached or applied without altering or injuring the frame of the Ford chassis. To adapt the unit it is not necessary to drill any holes in the Ford chassis, the extension being fastened by quick clamping devices and bolts through the original holes. The sprockets that go on the Ford axle are so designed that it is unnecessary to bolt together the sprocket plates. The axle is designed to

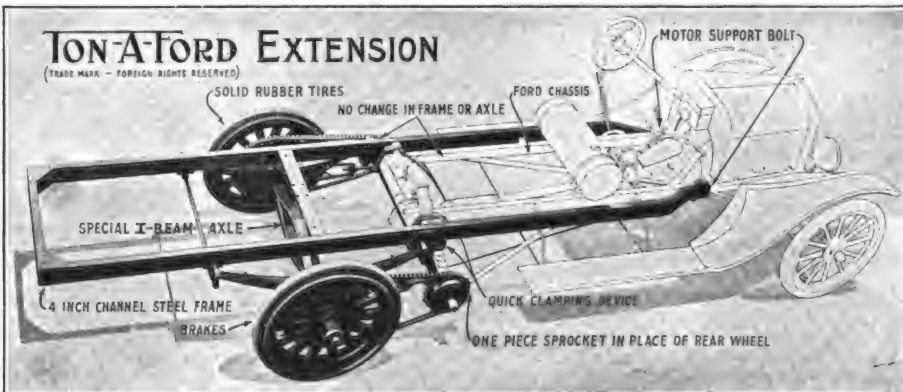
carry a 50 per cent. overload without buckling, and the wheels, of artillery type, are sufficiently heavy for a two-ton truck. Goodrich solids are used on the wheels. The springs are 2x44 inches, with a relief spring over the axle. The extension weighs 1000 pounds, has a capacity of 1½ tons and the wheelbase of 127 inches when attached gives extra large loading space. The price is \$375 f. o. b. Racine, Wis.

OVERTON TRUCK UNIT—The Overton Truck Co., Detroit, Mich., has placed on the market a truck unit with a number of novel features which sells at \$285. In attaching the Overton unit the Ford chassis is left intact and 14 heavy bolts are used to fasten the frame to the frame of the attachment without the need of boring any holes. The unit frame is 38 inches wide and is reinforced in an ingenious way at the front to prevent warping and excessive strain on the bolts. The Ford rear axle is used as a jackshaft for transmitting the power, being fitted with a shallow bell sprocket in place of the wheels. The sprocket is so designed that it can be fitted without any alterations being made in the original Ford construction and the possibility of breaking either the sprocket or hub is eliminated. The springs on the unit are set far apart on the axle and very close to the wheels, which reduces the tendency to bend the axle under heavy loads.

SMITH FORM-A-TRUCK—The conversion unit manufactured by the Smith Motor Truck Corporation, Chicago, Ill., was the first truck forming attachment placed upon the market in commercial quantities and is one of the best known, many thousands being used in all parts of the United States and other countries. The unit is made of a four-inch channel steel

frame, strongly reinforced with three cross members and gusset plates at the rear. The frame fits over that of the Ford chassis and the rear axle of the latter is used as a jackshaft, carrying two sprockets to transmit the power by chain to the sprockets of the wheels on the unit. The wheels of the unit are extra strong, of artillery type, with large spokes and solid 32x3½ tires. When attached the combination makes a durable one-ton truck and it is so designed that the new axle carries 90 per cent. of the load. The company also makes cabs and four different body types designed especially for the unit. The bodies and cabs are extra. The unit sells for \$350 f. o. b. Chicago.

METZ CONVERSION UNITS—The Metz Co., Waltham, Mass., entered the conversion unit field this summer with four different types of truck and tractor attachments. These include a unit for converting passenger cars into trucks of one-ton capacities, which is made with both chain and internal gear type of drive selling at \$350 and \$390 respectively; the Metz Convertertractor selling at \$300 and a universal truck attachment of two or more tons capacity, chain drive, known as the Metz Universal Truck Attachment, selling for \$400. The latter is designed for use with the chassis of the heavier type of passenger car. The one-ton unit with a chain drive has a frame of heavy five-inch channel steel, 168 inches long and 32 inches wide. It has a 2½-inch axle and roller bearings. The two side springs are semi-elliptic, 2½ inches wide and 48½ inches long, made up of 10 leaves. Heavy artillery type of wheels with 12 two-inch spokes are used, and they are fitted with Goodrich solid rubber tires, 32x3½ inches. There are 18 teeth in the drive shaft sprocket and 40 in the rear gear and they carry a heavy roller type chain with ¾-inch rollers and 1¼-inch pitch. The emergency brake, internal expanding type, is in a 13½-inch drum and the service brake has 1¼-inch contracting bands faced with asbestos. The one-ton internal gear drive unit has a frame, wheels, tires and springs similar to that of the chain drive unit, and is fitted with standard axles and extra heavy roller bearings. A universal type of propeller shaft is used and the gear ratio is approximately seven to one, the truck being designed for a speed of about 15 miles an hour. A loading space of



The Ton-A-Ford Conversion Unit for Ford Chassis, the Arrows Pointing Out Special Features of the Various Members.

from nine to 12 feet is available back of the driver's seat. Used with a Ford chassis the wheelbase is 125 inches and the weight complete about 2100 pounds.

MISCELLANEOUS—Several other makes of serviceable conversion units manufactured in addition to those described include the following, concerning which the names and principal facts are given in the accompanying table:

Name	Maker	Drive	Capacity	Price
Unity, Model A.A.	Unity Motor Truck Co., Cleveland, O.	Bevel gear	1 ton	\$84.00
Unity, Model A.	Unity Motor Truck Co., Cleveland, O.	Bevel gear	1 ton	\$124.50
Unity, Model D.	Unity Motor Truck Co., Cleveland, O.	Bevel gear	1 ton	\$147.50
Little Giant Converter-A-Car	Chicago Pneumatic Tool Co., Chicago, Ill.	Chain	1 ton	.....
Perfect Car Converter	Convertible Equipment Co., New York	Bevel gear	1250 lbs.	\$125.00
" No. 2	Convertible Equipment Co., New York	Bevel gear	1500 lbs.	\$135.00
" No. 3	Convertible Equipment Co., New York	Bevel gear	1800 lbs.	\$145.00
" No. 4	Convertible Equipment Co., New York	Bevel gear	1 ton	\$175.00
" No. 5	Convertible Equipment Co., New York	Bevel gear	2500 lbs.	\$185.00
Aurora	Simpson Mfg. Co., Downer's Grove, Ill.	Chain	1 ton	\$350.00
Franklin	Franklin Converter Co., Chicago, Ill.	Chain	1 ton	\$345.00
Stableford Equipment	Stableford Truck Mfg. Co., Chicago, Ill.	Bevel gear	.....	\$50.00
No-Chain	No-Chain Truck Unit Co., St. Louis, Mo.	Int. gear	1 ton	\$275.00
Indestructible	Indestructible Truck Co., Indianapolis, Ind.	Chain	1 ton	\$350.00
Goliath	Goliath Commercial Car Co., Chicago, Ill.	Chain	3000 lbs.	\$350.00
Andaford	Andaford Truck Co., Detroit, Mich.	Chain	2500 lbs.	\$295.00

The following addresses are also listed of makers of other truck forming attachments of the character treated in this article:

Ames Motor Car Co., Owensboro, Ky.
 American Manufacturing and Engineering Co., Detroit, Mich.
 Arnold Motor Car Co., 191-207 Paterson St., Paterson, N. J.
 Auburn Chassis Attachment Co., Auburn, Ind.
 Commercial Car Unit Co., Philadelphia, Pa.
 Commercial Truckmobile Co., Chicago, Ill.
 Convertible Equipment Co., New York City.
 Evans Truck Mfg. Co., Detroit, Mich.
 Globe Machinery and Supply Co., 205-11 West Court Ave., Des Moines, Ia.
 Industrial Equipment Co., San Francisco, Cal.
 Iowa Motor Truck Co., Ottumwa, Ia.
 Jewett Car Co., Newark, O.
 Kelley Convertible Auto Truck Co., Chicago, Ill.
 Lakeside Motor Truck Co., Chicago, Ill.
 No-Chain Truck Unit Co., St. Louis, Mo.
 Odell One-Ton Truck Attachment Co., Atlanta, Ga.
 Phenix Truck Makers, Inc., 2337-9 South Michigan Ave., Chicago, Ill.
 Pull-Ford Co., Quincy, Ill.
 Rayford Co., Philadelphia, Pa.
 Robinson Machine Co., Detroit, Mich.
 Simplex Truck Co., Chicago, Ill.
 Stevenson Truck Attachment Co., East Orange, N. J.
 Union Truck Mfg. Co., New York City.
 Woodward Truck Attachment Co., Los Angeles, Cal.
 Wright Truck Attachment Co., Seattle, Wash.

The following are classified as adapter unit manufacturers:

Walter J. Forbes, Boston, Mass.; Hayes-Diefenderfer Co., Inc., New York City; Laconia Truck Co., Laconia, N. H.; Maremont Mfg. Co., Chicago, Ill.; Martin Rocking Fifth Wheel Co., Springfield, Mass.; Motor Accessory Distributing Co., Boston, Mass.; Shadbolt Mfg. Co., Brooklyn, N. Y.; Xtend-a-Ford Co., Philadelphia, Pa.

SHOW MANAGERS WOULD EFFECT BIG SAVING IN COSTS.

The National Association of Automobile Show Managers at a meeting held in Chicago recently made plans for co-operating in securing the printing and decorative work necessary to stage their

annual shows as a means of effecting big economies.

Managers were present from Boston, Albany, Providence, Cleveland, Milwaukee, Minneapolis, Kansas City and San Francisco. They decided on the co-operative plan whereby more elaborate decorations can be secured at less cost than heretofore and the posters can be also obtained at an advantageous price.

JOHNSON HANDLES LEE TIRE IN NEW ENGLAND.

O. W. Johnson has been appointed manager of the new branch of the Lee Tire and Rubber Co., 1100 Boylston street, Boston, Mass., and will direct the distribution of Lee products in New England. George W. Bride, who has handled Lee tires for a long while, will continue as the Boston dealer.

Mr. Johnson was formerly representative of the Hartford Rubber Works at Buffalo, N. Y., and later represented the U. S. Tire Co. in that territory. He also represented the latter company in the middle west and southwest at one time.

BOSTON CLOSED CAR WEEK.

The Boston automobile dealers will hold special closed car exhibitions in their salesrooms for a week, beginning Saturday, Oct. 6, and many of the distributors during that period will also show their entire line for the 1918 season, including all the models of open cars.

AMERICA'S OWN LIBERTY MOTOR

Engineers from the Automobile Industry Meet Emergency With Triumphant Success

AMERICA has astounded the world with its phenomenal production of motor cars and her engineers' established reputations for quantity production that staggered those of the old world, but these accomplishments grew out of normal business conditions in peace times and no one knew what the United States motor car engineers would do when the call to meet an emergency was issued.

The answer was the Liberty motor, developed in little less than a month, built from parts made in 12 different factories stretching from Connecticut to California, and delivered in Washington and set running on Independence day as a warning that America was quick and capable of meeting all challenges against her independence.

A more wonderful feature of the Liberty motor, however, since foreign engineers have been developing aircraft motors for over three years under pressure, is that it is not an engine designed to fit an emergency, but one that has no peer in the world, is interchangeable to a degree heretofore never attempted and weighs less per brake horsepower than the best engines made in Europe.

The history of the Liberty motor is tersely and interestingly narrated in Secretary of War Baker's official report, made after the motor had passed all tests satisfactorily. After dwelling upon the circumstances that lead up to the creating of the motor the secretary said:

"Two of the best engineers in the country, who had never before seen each other, were brought together at Washington and the problem of producing an

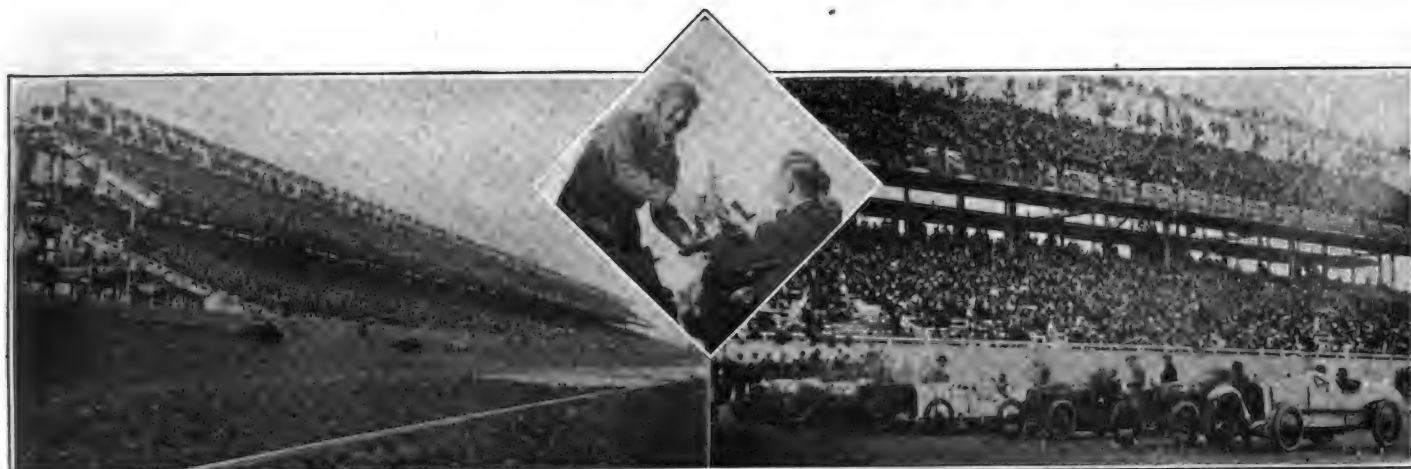
all-American engine at the earliest possible moment was presented to them. Their first conference, on June 3, lasted from afternoon until 2:30 o'clock in the morning.

"These two engineers were figuratively locked in a room in a Washington hotel and charged with the development of an aeroplane motor for use by American aviators over the battlefields of Europe. For five days neither man left the suite of rooms engaged for them. Consulting engineers and draftsmen from various sections of the country were brought to Washington to assist them. The work in the drafting room proceeded continuously day and night. Each of the two engineers in immediate charge of motor development alternately worked a 24-hour shift.

"The two engineers locked together in a hotel room in this city promised the government if given an opportunity they would design a satisfactory engine before a working model could come from Europe.

This story only summarizes the wonderful work that was accomplished by the engineers of the aircraft production board working with the U. S. Bureau of Standards and the War Department. Over a score of engineers cooperated in the work, but it is understood that the two men upon whom the bulk of the labors fell and to whom the most credit for the achievement is due are Major Jesse G. Vincent and Major E. L. Hall.

The interchangeability of the Liberty motor is one of its most remarkable features and will make it possible to reconstruct new engines from mixed parts of wrecked eight or 12-cylinder motors.



Mulford, Benedict and Hearns Brushing by the Stands in the Harkness Trophy Race—Great Grandstand Overflowing When Stars Lined Up for the Final Heat of the Futurity Handicap. Insert: Chevrolet Presented with the Trophy.

Speed Records Smashed at Sheephead Bay

Chevrolet Wins 100 Mile Race With Mark of Better Than 110 Miles an Hour—Five Other Stars Finish in Better Than World Record Time

LOUIS CHEVROLET won the 100-mile auto race for the Harkness gold trophy at Sheephead Bay on Sept. 22 in what proved to be the greatest motor contest ever held in the world from point of speed, the winner maintaining the average speed of 110.4 miles an hour. His time for the distance was 54:20.98, or 2½ minutes better than the previous world's record for the distance of 100 miles, which was 56:57.72, made by Dario Resta on the same track in 1915.

Ralph De Palma, who made the distance in 56:18.40, also shattering the old record, came in second and throughout the race forced Chevrolet into his phenomenal high speed in order to keep his lead. De Palma was looked upon as the favorite up to the 46th lap, when he had to go to the pits to replace two tires. This stop cost him a lap, which handicap he was unable to overcome. There were 17 starters, but after the first lap and up to the 46th, the contest was between Chevrolet and De Palma. Eddie Hearne finished third, Ralph Mulford fourth and Ira Vail fifth, all averaging better than 105 miles an hour. Five other drivers finished. Seven dropped out from various troubles.

One disappointment marred the race. Dario Resta, the champion of 1915 and 1916, was forced out at the end of the seventh lap by a broken camshaft. Many had looked upon Resta as De Palma's closest competitor, as early in the week preceding the races he had circled the track at an average speed of 119 miles per hour. It was nip and tuck between him and Chevrolet for 14 miles, and in the 16th mile he took the lead, holding it until the accident happened that put him out of the running. De Palma, who, in the meantime, had been watching his chance in the rear to creep ahead of the

FINISH OF HARKNESS TROPHY RACE.

Driver	Car	Time	M.P.H.
Chevrolet.....	Frontenac	54:20.98	110.4
De Palma.....	Packard	56:18.10	106.5
Hearne.....	Duesenberg	56:41.15	105.8
Mulford.....	Frontenac	56:41.50	105.8
Vail.....	Hudson	56:41.87	105.7
Hickey.....	Hudson	60:39.70	98.8
Lewis.....	Hoskins	60:48.30	98.7
Henning.....	Mercer	60:48.85	98.7
Milton.....	Duesenberg	60:55.20	98.5
Benedict.....	Benedict	61:42.80	97.3

The races who failed to finish, given in the order in which they dropped out were: Resta, Frontenac; De Vigne, Delage; Le Cain, Delage; Halbe, P. A. L. C.; Alley, Pan-American; Henderson, Duesenberg; Boyer, Frontenac.

two leaders, came up and took Resta's place as Chevrolet's immediate opponent. The latter began to set a pace that was

never before witnessed on a speedway in a regular race, averaging better than 111 miles an hour at times. De Palma, however, refused to be shaken off and at the 50-mile mark, which Chevrolet made in 26:57.05, his time was 27:17.60, De Palma was thus 20.55 seconds behind the actual time he had lost in changing tires.

While not maintaining the terrific speed of Chevrolet and De Palma, Hearne, Mulford and Vail, who finished in the order named, drove a remarkable race, all averaging within a fraction of a second of 105 miles an hour throughout the race and finished within seven-tenths of a second apart.

The crowd was the biggest ever attending a race meet at the track and while the spectators appreciated the grilling grind that the drivers went through in



Narragansett Park Track: Above, Racing Drivers and Mechanics Lined Up in Front of Automobile Journal Staff Photographer; Below, Speedway Stars Lining Up for the Start of the 100-Mile Race.

the 100-mile event, they showed more enthusiasm and greater interest in the Futurity Handicap of 10 miles, which was run off in three heats and a final, De

with Louis Chevrolet second.

Milton established two new track records, making the 100 miles in 1:24:44.28 and the 25-mile event in 19:46.28. The former record for 100 miles on the track was established by Eddie Rickenbacher in 1915 and the 25-mile record that was broken, was made by Bob Burman in the same race.

The big race was being hotly contested up to the 25th mile when an accident put out Mulford, who had been keeping his Frontenac up with Vail's Hudson and Milton's Duesenberg. Vail took the lead in the 12th mile and held it up to the last mile, when Milton, who had been tenaciously hanging on to his rear, overhauled and passed him, crossing the tape with a lead of less than 40 feet. Vail apparently lost the race on account of

leaders up to the 21st mile, when he opened up the throttle and went into the lead just when Mulford, experiencing tire trouble, had to drop out of the race.

The order in which the racers finished at Narragansett Park, their time and prize money, is shown in the following table:

100-MILE SPEEDWAY DERBY, CLASS E, 300 CUBIC INCHES OR LESS.			
Milton, Duesenberg.....	1:24:42.23	\$3000	
Vail, Hudson.....	1:24:44.28	1600	
Hearne, Duesenberg.....	1:25:31.35	1000	
Lewis, Hoskins.....	1:27:36.32	800	
A. Meyers, Pugh.....	1:29:56.50	600	
Henderson, Duesenberg.....	1:31:56.38	500	
Elliott, Oldfield.....	1:32:09.03	300	
Chevrolet, Frontenac.....	1:34:15.15	200	
25-MILE RACE, CLASS E, NON-STOCK, 300 CUBIC INCHES OR LESS.			
Milton, Duesenberg.....	19:46.28	\$1000	
Vail, Hudson Special.....	20:07.55	500	
Chevrolet, Frontenac.....	20:22.22	250	
Hearne, Duesenberg.....	20:28.52	150	
Meyers, Pugh.....	21:47.88	100	
5-MILE RACE, CLASS E, NON-STOCK, 300 CUBIC INCHES OR LESS.			
Mulford, Frontenac.....	3:58.83	\$200	
Chevrolet, Frontenac.....	3:59.30	150	
Milton, Duesenberg.....	3:59.40	100	
Joe Boyer, Frontenac.....	4:00.30	50	

"FLATER FLIVER" SHOWS GOODS.

The "Flater Fliver," recently put on the road by the Black & Decker Manufacturing Co., Baltimore, Md., is a Ford car fitted out by this company to demonstrate their goods to the jobbers and prospects. The "Flater Fliver" carries a No. 2 Lectorflater Tank Outfit, mounted on the rear deck, and permits the salesman to make a demonstration of the unit at each place he calls.

HOW ARE YOU CONSERVING FUEL?

Attention is called to the question on page 40 appearing in the Queries column and relative to the burning of KEROSENE OIL in the modern gasoline engine as a fuel. It should be of interest to every reader because the big slogan today is "CONSERVATION OF FUEL." Give other readers the benefit of your experience with kerosene devices for carburetion.



Tom Milton, Twice Winner of the Narragansett Park Track, with his "Lucky Seven." Louis Chevrolet Snapped Eating an Ice Cream Cone at Providence.

Palma winning the latter in 6:11.6, an average speed of 96.9 miles an hour. Chevrolet finished 18/100 of a second later.

LeCain won the first heat, driving a DeLage. He covered the 10 miles in 6:07.6. De Palma won the second heat in 6:20.4, and Boyer, driving a Frontenac, won the third heat and made the best time of any of the Futurity events, covering the distance in 6:07.51, an average speed of 97.9 miles an hour.

America's preparations for war were a big number on the programme, a battalion of troops going through manouvers in the big enclosure throughout the races, while De Lloyd Thompson in a military biplane gave the spectators some thrills that were very impressive. He rose to an altitude where his machine appeared like a speck in the sky and after imitating the antics of a tumbler pigeon sailed about the track gracefully.

Providence Big Day.

Tom Milton with his Duesenberg special won the two principal events at the Narragansett Park Speedway in Providence on Sept. 15, and Ira Vail in a Hudson followed him across the tape in second position in both races.

Louis Chevrolet, Ralph Mulford and Joe Boyer were in the field with a trio of Frontenacs and Barney Oldfield also started in his Golden Submarine, but all of these stars had bad luck in the big events. Mulford won a five-mile event,

soft tires, which caused him to swerve into the rail on the final turn, knocking two spokes from one of his rear wheels. For fully 10 miles before the finish Vail knew that his tires were soft, but with Milton hugging his heels so closely he took the chance of romping home on his rims rather than risk the loss of position by stopping to change tires.

Milton made the same kind of a finish in the 25-mile event, hanging close to the



Eddie Rickenbacher, a Driver for Gen. Pershing Shaking Hands with Arthur Duray, Holder of World's Speed Record of 142.9 Miles per Hour, "Somewhere in France." Rickenbacher Sends Word to America that Foreign Makers Are Planning World-Beating Racing Cars for "After the War."

Adjustment of the Four and Six Cylinder Studebaker Cars

This is the sixth of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The seventh article of this series, which will appear in the Oct. 10th issue of the Automobile Journal, will be devoted to the Dodge Brothers car.

THOUGH the construction of the Studebaker engine has been changed somewhat, when those now in active service are to be considered, the general design of the transmission gearset and rear axle has remained practically the same for some time.

Both the four and six-cylinder engines of the series 16, 17 and 18 are of the L head type, and the cylinder heads are not removable, being cast in block with cylinders. The valves may be ground and the carbon removed from the pistons and explosion chambers without disassembling the engine.

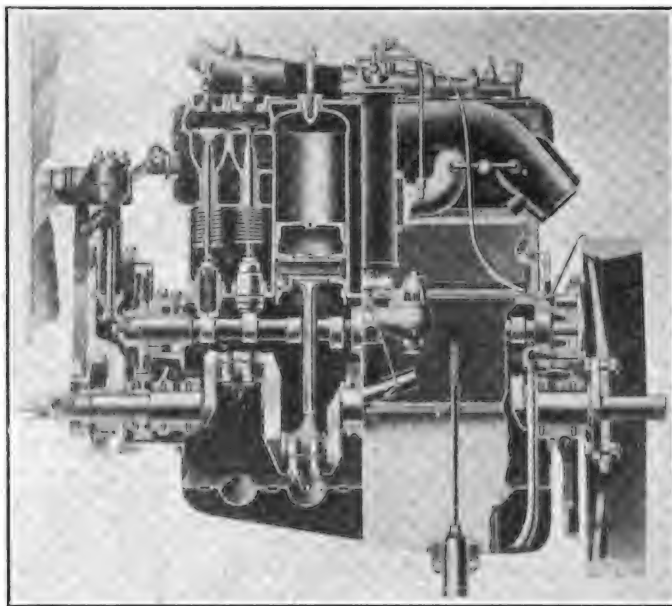
The water is first drained from the radiator and if the overhaul is to be complete the radiator should be removed from the car so as to render the engine more accessible.

The horn should next be removed and placed to one side, leaving the wire connected to it. Disconnect all of the secondary wires at the spark plugs and mark them with tags so that they may be replaced. The secondary clips having been removed, slip off the distributor head and disconnect the wire leading from the distributor to the coil. The secondary wire assembly may then be removed from the car.

Water Jacket, Cylinders, Pistons.

After the water hose connections have been uncoupled the nuts on the top of the water header should be unscrewed and the water header, which forms the top of the engine, lifted off. This will expose the interior of the water jacket. With a stiff wire or scraper loosen and take out all of the old scale and deposits from the jacket.

The studs which fasten the water header to the block are screwed into plugs, which in turn are screwed into the cylinder heads. These plugs may be removed with a wrench, leaving a large hole, through which may be inserted scrapers for removing the carbon deposits in the cylinders. A point



Cross Sectional Cut of Engine, Showing Oiling System and Timing Gears.

that should be noted is the length of the studs, the longest being at the front, ranging to the shortest, which is at the rear. When the plugs are replaced they should be coated liberally with white lead to prevent water leakage into the cylinders.

The next step is to remove the valve caps, for which a special hexagonal shaped wrench is necessary. When these are removed the valve chambers are exposed and through these holes the balance of the carbon may be scraped from the pistons and explosion chamber. For this purpose a special carbon scraper may be obtained from the supply dealer. When carbon is scraped from the cylinders in this way the piston in the cylinder upon which the work is being done should be at or near the top of its stroke. Unless this point is observed there will be danger of scratching or scraping the cylinder walls.

Inspection of Fuel System.

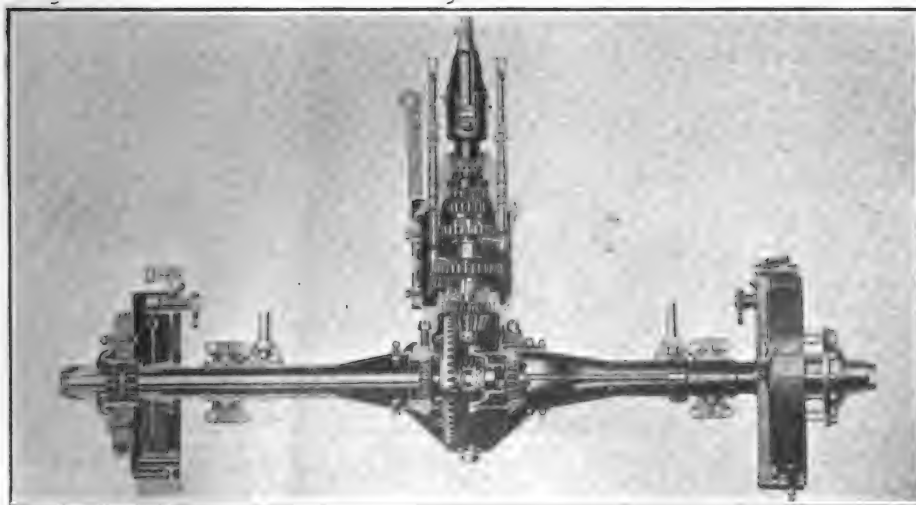
Turn off the gasoline at the tank and drain the fuel from the system at the carburetor, then disconnect the fuel line at the carburetor. The vacuum tube leading from the intake manifold to the vacuum tank should next be disconnected, as well as the carburetor control rods.

The intake manifold of the four-cylinder engine is held in place by two yokes, which also serve to clamp down the exhaust manifold. The intake manifold of the six-cylinder engine is clamped in the same way, but is also fastened to the block by two cap screws at the middle inlet passage.

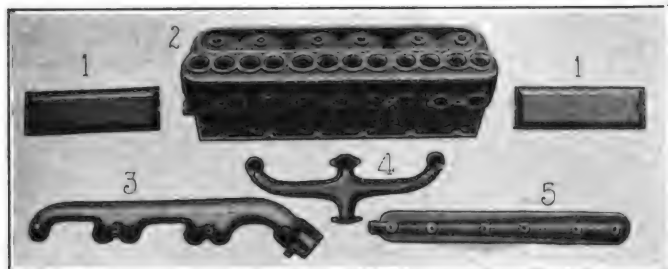
In addition to the clamping yokes the exhaust manifold of the four is bolted to the cylinder block between the exhaust ports of the second and third cylinders, while the six is fitted with two studs, one between the second and third, the other between the fourth and fifth cylinder ports. When these studs and yokes have been taken off the two manifolds may be taken from the engine.

The valve cover plates are held in place by three wing nuts. The covers should next be removed and the valve springs lifted by means of a Y iron or valve lifter, the pins taken out and the caps and springs removed.

When this type of engine is being overhauled it is convenient to leave all valves in their respective places, removing them only as they are being ground. This obviates the necessity of marking them.



Cross Sectional View of Transmission Gearset and Rear Axle.



1, Valve Dust Cover; 2, Cylinder Block; 3, Exhaust Manifold; 4, Intake Manifold; 5, Water Header.

Before beginning the grinding a piece of waste or cloth attached to a piece of string about 12 inches long should be tucked into the port and against the piston, which should be at the top of its stroke. If this is done there is little danger of any grinding compound getting in the cylinders.

But little grinding compound should be used, and after the valves have been ground the parts must be given a careful washing with kerosene or gasoline. Great care should be exercised to prevent compound from getting into any of the working parts, particularly the valve stem guides and cylinders.

After the valves have been ground the springs, caps and pins should be replaced. Before replacing the valve caps they should be coated with graphite and oil, since leakage at this point will seriously impair the working of the engine.

After the oil has been drained from the system, the oil pan, which is bolted to the lower part of the crank case, should be removed and given a careful cleaning with kerosene and a scrubbing brush. When the pan is removed the crankshaft, camshaft, connecting rods and oiling system are exposed.

For ordinary adjustments the removal of one or more shims is sufficient to enable one to repair the connecting rod bearing. If the bearing is broken, or badly worn, it may be removed through the lower part of the cylinders and crank case after the crankshaft has been turned to the right position. Before putting the connecting rod and piston assembly to one side, each piston should be marked so that it may be returned to the cylinder from which it was removed.

The caps and babbitts of the main bearings may be replaced with new ones, or repaired if necessary, but to renew the upper or inner part it will be necessary to remove the engine from the chassis.

The generator wires should next be disconnected and tagged, as well as the wires leading from both the coil and starting motor to the junction box and the junction box removed.

The generator is held into place by three cap screws in the crank case and one on the cylinder block. These should be removed and the generator lifted from its place. The fan bracket, which is held in place by one bolt, should then be removed, leaving the engine block free.

Close Attention to Cylinders.

The cap screws, which fasten the cylinder block to the crank case, are next removed and the cylinder block lifted from the crank case. A careful examination should be made of all of the cylinders and should they be scored or badly scratched they should be repaired, either by a chemical process of plating, or by grinding. A frequent cylinder trouble in any engine is the wearing out of round of the cylinders. For this reason the diameters of the cylinders should be measured and compared. With the cylinder block removed the valve tappets and guides may be taken from their places and repaired or replaced with new ones.

The next step in disassembling is the removal of the hand

starting crank ratchet. This ratchet is fastened to the crankshaft with a left hand thread and may be removed with a wrench, turning toward the left, while the flywheel is being held by an assistant. When this ratchet is removed the starting clutch is exposed. The starting clutch unit is keyed to the shaft and may be removed with a wheel puller. First, however, the starting motor and chain must be taken off.

Handling the Starting Motor.

For tightening up the chain the starting motor is hung upon a hinge device, which allows it to swing in a small arc. The lower end of the motor mounting casting is fastened by a cap screw. The cap screw should be loosened, allowing the motor to swing, then the chain removed. The hinge bar is a piece of steel rod, held in place by a cotter pin. Remove the cotter pin, drive out the bar and the starting motor may be taken from the engine. The starting clutch unit may then be pulled from the crankshaft.

The screws which fasten the distributor, as well as those fastening the ignition coil to the engine, should next be taken out, and these units removed. The bolts holding the water pump outside housing are next removed and the cover taken off, exposing the water pump blades.

The timing gear case cover is next removed, exposing the timing gears. Should any of the timing or distributor gears be worn they may be removed at this time, though it is not necessary to remove them to complete the disassembling of the engine.

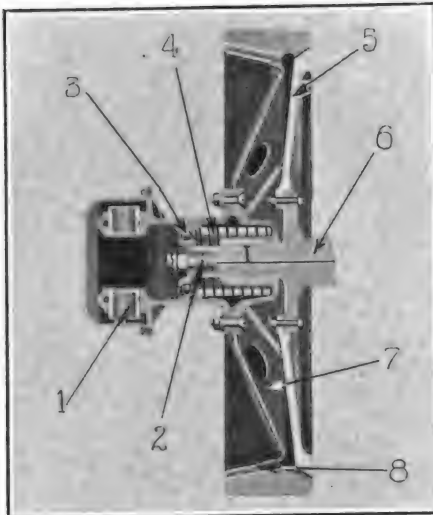
The front bearing of the camshaft is held into place by a set screw. When this screw has been removed the camshaft may be driven from the engine by using a bar of wood or soft iron.

In the later models the engine may be removed from the chassis without first removing the flywheel. Engines of the older models, however, require the removal of the flywheel before they can be taken out of the chassis.

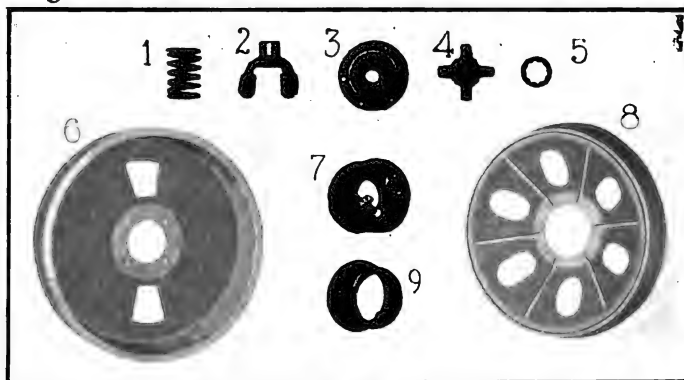
For convenience, it is best to draw the rear axle and transmission unit back a few inches before the flywheel and clutch assembly is removed. Disconnect all of the brake rods and gear controls from the transmission and after removing the cotter pins, disassemble the universal joint. After the universal joint has been disassembled remove the grease or oil cup from the clutch hub, and with the pedal pressed down

as far as possible in the oil cup hole, insert a heavy nail or machine screw. When this is done the clutch spring will be held compressed. The nail should be left in place until the car is reassembled, or it will be an extremely difficult matter to recompress the clutch spring.

Between the yoke arms forming the universal joint will



Cross Section of Clutch: 1, Clutch Hub; 2, Retaining Stud; 3, Clutch Thrust Ball Bearing; 4, Clutch Engaging Spring; 5, Flywheel; 6, Crankshaft; 7, Clutch Cone; 8, Clutch Facing.



1, Clutch Engaging Spring; 2, Front Universal Joint Yoke; 3, Clutch Cone Hub; 4, Front Universal Joint Cross; 5, Clutch Thrust Ball Bearing; 6, Flywheel; 7, Clutch Hub; 8, Clutch Cone; 9, Front Universal Joint Front Housing.

be found a nut, which is screwed to the crankshaft. This nut is next removed, allowing the clutch drum to be removed from the car.

Removing the Flywheel and Engine.

Four bolts fasten the flywheel to the crankshaft and when these are removed the flywheel may be taken from the car.

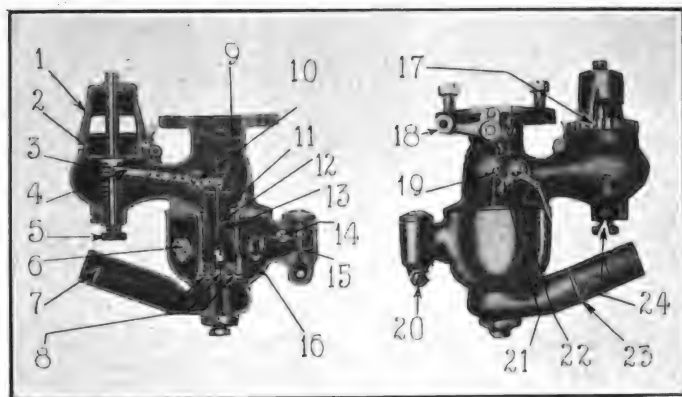
The flywheel and clutch assembly may be removed with the engine on the series 18 model. On this model, after the universal joint has been disconnected and the pin put in the clutch to hold the spring under compression, the engine and clutch assembly may be removed.

The engine is held in the frame at four points, two in front and two in the rear. Remove these four bolts and the engine may be lifted forward and out of the frame. With the engine removed, the crankshaft with the timing gear may be taken out, if it is found necessary to replace the main bearings.

The oil pump is fastened to the rear of the crank case and should be removed and cleaned. All of the oil piping should be flushed with kerosene and the foreign matter forced out by means of a stiff wire. When the pump is put into place and the engine reassembled the priming plug should be removed and the pump filled with oil. If this is not done there is danger of the engine running dry, since a gear-pump sometimes fails unless it is running in oil, particularly if the gears have been wiped clean.

Replacement of Clutch Facings.

The clutch facing should be examined carefully and replaced with new material, or washed with kerosene and given



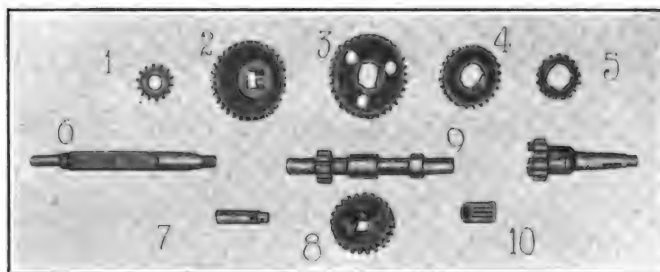
Carburetor: 1, Auxiliary Air Valve Cap; 2, Auxiliary Air Valve; 3, Air Valve Spring; 4, Auxiliary Air Valve Lever; 5, 24, Auxiliary Air Valve Spring Adjusting Nut; 6, Float; 7, Warm Air Intake; 8, Gasoline Passages; 9, Throttle Valve; 10, Air Valve Pivot; 11, Venturi Mixing Tube; 12, Needle Valve; 13, Spray Nozzle; 14, Float Valve Pivot; 15, Float Valve; 16, Float Chamber; 17, Auxiliary Valve Cap Adjusting Nut; 18, Throttle Valve Lever; 19, Throttle Adjusting Stop; 20, Gasoline Inlet; 21, Stop Boss; 22, Cam Lever; 23, Air Cutout

a bath of neatsfoot oil as condition warrants. In replacing clutch facings it is important that the copper rivet heads be driven well below the facing surface, or the clutch action will be uneven.

As will be seen in the illustration, the clutch unit consists of the drum, which is bolted between the two body parts, which contains the heavy spring and the ball thrust bearing. Unless it is unavoidable this unit should not be disassembled because of the difficulty in compressing the spring.

Although it is not necessary to remove the transmission and rear axle assembly from the car for disassembling, it is more convenient to do so. When the nuts which fasten the transmission gearset to the rear axle have been removed, the gear case may be drawn from the axle, bringing with it the pinion gear and propeller shaft assembly.

There are two universal joints, one at the front, which has been spoken of, the other at the rear of the propeller shaft. The rear joint is enclosed in a boot, which is fastened to the housing and to the propeller shaft by clamps. These clamps are removed and the boot slipped back upon the shaft, exposing the rear joint, which may be slipped apart. It is



Transmission Gearset Parts: 1, Reverse Idler Gear; 2, Low and Reverse Sliding Gear; 3, Countershaft Gear; 4, Countershaft Intermediate Gear; 5, Countershaft Low Speed Gear; 6, Transmission Main Shaft; 7, Reverse Idler Gear Pin; 8, High and Intermediate Sliding Gear; 9, Countershaft; 10, Transmission Shaft Front End Bearing with Main Drive Pinion.

essential that both universal joints be in good condition. Should there be the slightest lost motion or signs of wear, the worn parts should be replaced with new parts or knocks that might be difficult to locate will result.

The rear universal joint body is both keyed and held to the gearset main shaft by a nut, which should be removed and the joint body pulled from the shaft. The bevel pinion gear on the opposite side of the gearset is fastened in a similar manner and should also be removed.

After the rear universal joint has been removed the eight screws, which hold the transmission front cover in place, should be taken out and the cover with bearing taken off, exposing the interior of the gearset. The top cover should be removed next to facilitate the work.

Operations in the Gearset Interior.

The front roller bearing outer race is clamped into place by a bolt, which passes through the flange. When the bolt is removed the race may be drawn from the case for examination. After the transmission gearset covers have been removed, both the main shaft with all gears and the countershaft may be removed. The rear bearing race is held in place by a set screw and when the screw is removed the race may be driven from the case.

The rear axle is of the full floating type, therefore it is unnecessary to disassemble the housing. The first step in the disassembling of this unit is the removal of the differential cover plate. Next the nuts on the wheel flanges are removed. When this is done the shafts may be withdrawn from the axle.

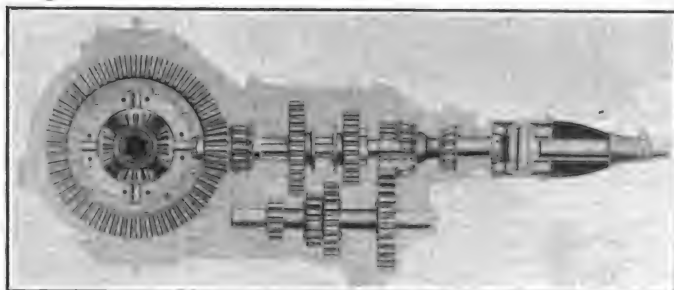
After the shafts are removed, inside of the wheels will be found a large lock nut, which is kept from turning by means of a washer having a bent over lug. Straighten this bent edge and turn off the large nut. The wheels may then be taken off and the roller bearings examined.

The differential is mounted upon two roller bearings, the outer races of which are mounted in two clamp supports. The two supports are integral with studs, which extend through the front part of the housing and serve to fasten the transmission gearset to the axle. Since these nuts have been removed in taking off the gear case, the supports with the differential may be pulled from the axle through the hand hole at the rear.

Differential Gears and Pinions.

After the differential unit has been removed the clamping bolts may be loosened, the clamps and bearings taken off.

(Continued on Page 46.)



Phantom View of Transmission Gearset and Differential.

Milady of Motor Defies Jack Frost

The New Garments Built For Motoring
Are Most Effective Means of Taking Our
Minds Off Our Departed Summer Clothes.

By MRS. A. SHERMAN HITCHCOCK.

WITH the evolution of the motor car the dress of the motorist has correspondingly developed until it now occupies a distinct place in the realms of fashion, and is as smart in appearance and as practical and comfortable as could be desired. Coats, suits, frocks and hats for motoring seen at the smart shops are extraordinarily chic this fall. The frock to be worn underneath the long coat is of great importance to the motor woman, for she wishes to be appropriately garbed when she removes the outer garment. One of the most practical materials for the motor frock this season is Honey Cloth, an entirely new fabric of thoroughly reliable worsted, with a surface that feels almost as smooth as a broadcloth and that is so constructed that it will give unlimited

service—a quality greatly appreciated by every motorist. This cloth is 54 inches in width and very reasonable in price and comes in the new shades, olive drab, rust, oxford, navy, brown, green, silver gray, taupe and marine blue. It may be had in plain and fancy weaves and would make a very chic one-piece frock.

Another fabric just brought out and particularly adaptable for wear in the



This stole and muff are of skunk and the lining is of the new printed Indestructable Voile in a color combination of blue, red, green and tan. These linings are to be used extensively for fur garments this year. The modish motor hat of velvet, and smart frock touched with embroidery and beading, completes a fetching ensemble. Photograph posed by Margaret Owen of the Boston Opera Co. Courtesy Balch, Price & Co., Brooklyn, N. Y.

motor is the Nu Vogue, one of the fabrics made to exactly simulate wool—something being tried to a considerable extent now that the government has requisitioned such vast quantities of wool—and is in checks and plaids in all the new and standard color combinations, stripes and fancy weaves. They are 36 inches wide, of moderate price and very durable. A particularly attractive plaid for the motorist combines several shades of blue, black and yellow. Another is gray, green, black and red, and still another is in tan, blue, black and yellow. Every motor woman in preparing her fall wardrobe should take particular notice to secure fabrics which are absolutely reliable, for there has never been a time within our knowledge when the question of fast colors has been so serious, and what is more deplorable and unsatisfactory than a faded garment. It be-



Graceful indeed in Hovland coats for the fall season is this new model of peach colored Bolivia, with a large protective collar of kolinsky fur. Original features are the novel sleeve and the double strap in the back. Courtesy Hovland-Sardeson-McColm Co., Chicago, Ill.

hooves her, therefore, to select reliable brands for her frocks and coats.

Types in Motor Coat Design.

There are two distinct types of motor coats, the smart and more severely built garment for open car wear, and the one of rich materials, which may have any amount of elaboration, to be worn in the limousine or sedan. There are some designers who excel in the former style, while others are especially good at the dressy type, but there are few masters of both.

An exception to the general rule are the coats of Hovland make. Their line of coats for the motoring woman embrace the type of coat which is correct for general use in the open car, those which are dashing and original in the smart and dressy limousine style, and all their models are graceful, charming garments, elegant and distinctive, and of exclusive originality. I am showing two of their models. The one of peach colored Bolivia is a stunning garment, and we are doubtless all aware that Bolivia is one of the most important materials for coats. It is very light and soft and comes in the most delectable shades and possesses a vast amount of warmth. This model is in the new straight line effect and has a wonderfully protective and beautiful collar of kolinsky, a most attractive brown fur which is high in fashion's favor. The other model is of



There are some ideal new models in the Schmidt-Knit Sweaters. In this lovely model of silk is to be found all the little details of finish, dainty perfections and quality which delight the heart of the feminine motorist. In combinations of the smartest colors. Courtesy Standard Knitting Co., Cleveland, O.

Fall and Early Winter Modes

Models in Furs and Winter Garments Marshalled Here From the Autumnal Fashion Parade Especially For the Automobile Journal.



Is it that she is so pleased with her new motoring coat of Pom-Pom (one of the season's new and most attractive materials), or that she can't just make her eyes behave? Anyway, she is up to the minute in smart style. The large collar is particularly good, as it can be brought snugly up around the neck and buttoned there. Lined with Cheney silk; approved colors. Courtesy Hovland-Sardeson-McColm Co., Chicago, Ill.

a material new this season—Pom Pom. The coat is of the utmost simplicity, but endowed with such inimitable cachet and chic that the average tailor would find it a difficult matter to duplicate satisfactorily.

Leading Coat Materials.

Leading materials for motoring coats are Bolivia, Duvetyne, Duvet de Laine, Velour, Chenille Striped Coating, Pom Pom and Hilendale. They are all light and soft and in lovely shades. An attractive model for the closed car is of blue lavender Velour, lined with Pussy Willow silk in which shades of lavender predominate. There are little shirred pockets in the lining that are so invaluable to the motor woman for the stowing away of small articles.

An ultra smart coat is of white Duvetyne, trimmed with black and scarlet changeable chiffon velvet, and with a lining of bright cherry colored Pussy Willow satin, which makes a charming splash of color when the coat is thrown across a chair in a tea room or a restaurant.

The Vogue of the Sweater.

Just what the motor woman would do had not some public benefactor conceived the sweater is difficult to say. Perhaps there would be other comfortable means

for keeping warm chilly days and damp evenings. There is such a strong prejudice nowadays against heavy underclothing, its place being supplied by outer garments, and the fact remains that motor women would much miss the sweater if it were removed as a clothing. The manufacturers have taken up the sweater garment with admirable judgment and the result is garments of perfection in wool, silk and fiber. Silks, shetlands, jersey, light and medium worsted in all the fashionable shades and in all the newest designs are included in the out-



This very new, military looking, practical headgear has its distinctive charm, and takes the veil easily and attractively. It is of the crocheted type and comes in popular colors to harmonize with one's eyes, and if, like this charming motorist, you have "a little bit of Egypt in your eyes" coral color is most fascinating.

put. They are exceptional in their fit and motor women fully realize the discomfort of an ill-fitting sweater. Then quality and workmanship has much to do with the lasting virtues of a knitted garment and, above all, the motorist does not want a sweater that loses its color. Here again the dye question is a grave proposition and it is well to be very sure in buying only a thoroughly reliable garment. A popular silk sweater is of the jersey weave and comes in gray and rose, Copenhagen and white, purple and white, ocean green and white, rose and white and other attractive combinations. It is of pure silk and has a fancy pocket, notched sailor collar and sash. Perhaps the colors most popular in smart sweater-edom just now are purple, canary and rose, trimmed with white.

Motor Hats Run to Height.

A motor hat can go as far as it likes

this season; that is, as far as height is concerned. Each new motor model seems to say to the last one, "I'll raise you one," but to be in the mode the crown must be high. A novel model is made exactly like the French soldier's forage cap and is of castor, bound with burnt orange ribbon. Smart motor hats are of Duvetyne in charming shades of green, blue and brown, and are often trimmed with very small wings. Leather forms no small part in the making of this season's motor hats. A small hat is of crow blue Roshanara Crepe, with a wing of leather, and narrow strips of crow blue suede edged with furlough red silk on the brim. The shirred fur toques are among the distinctly new arrivals. Beaver and squirrel are greatly favored for millinery purposes. A brown leather hat with a sharp peak at the front flaunts



This Schmidt-Knit model is one of the newest among garments indispensable to the motor woman, and is of wool, in all the modish colors, with large sailor collar, cuffs, belt (or sash) and pockets in flaps of white. Courtesy Standard Knitting Co., Cleveland, O.

a gold metal tassel at the very top. These metal tassels have a military suggestion which goes well with the mood of the moment, and the fashionable motorist is not averse to military effects if they are not too pronounced, and this fact has not been overlooked by the designers. There are many military suggestions in motor millinery, but they are quite adroitly manifested and introduced in feminine fashion.

Smart Motoring Boots.

Warm knickerbockers are very desirable for motoring and boots of extra length should also be worn. The black silk or satin knickerbockers, flannel lined, may be bought at any good shop, and it is an easy matter with a good pattern to make a pair matching a skirt in color. If the silk itself is not washable the flannel or cotton lining must be detachable so that it can easily be removed and laundered. The high boots of quilted satin reaching just below the knee and fastening with small buttons are very shapely and comfortable and pull on over the shoe. There are also boots of beaver and squirrel which have a lining of lamb's wool and fasten at the front with large ornaments made of silk cord. Other smart motor boots are of oiled grain tan leather, which are warm and strongly made.

All the really modish motor woman are now wearing veils of Shetland wool. They are made in fancy mesh, woven closely, and are said to be the finest protective imaginable for the complexion. They are very soft and fine and are long enough to tie closely about the neck. White is popular and lavender is dainty and attractive. Brown is much worn in these veils, as are also green and gray. The ends are finished with a heavy thick fringe. The new veils of knitted silk are popularizing themselves rapidly with motorists also.

Blouses for Motor Wear.

A well cut, well made satin blouse is excellent for motor wear and most women find a blouse of this kind becoming.

One made of the heavy Roshanara Crepe, with a soft rolling collar fastened with two large pearl buttons, is distinctly good taste. The small shoulder yoke and armholes are corded with the material. There are generous turned back cuffs also corded at the edge. Some of the smartest blouses for motor wear are put on over the head. A bit of color is often introduced in an effective manner. A blouse of white Kashmir Kloth is made with a small vest effect in the front and a row of tiny glass ball buttons trims the middle of the vest and the deep cuff, which runs up to a point almost to the

elbow. The wide collar is piped in a dull brick red, a color of which we are to see much this season. Another charming blouse is of brick red Pussy Willow satin and falls straight from shoulder to hip. It is finished with the very tiniest of silver tassels. Another of blue Pussy Willow satin has a belt which crosses in front and buttons on each side. It is very often that these little unusual touches proclaim the garment to be one of originality and exclusiveness, and the motor woman who gives her attention to the little details is always sure to be well groomed and well dressed.

ANTI-GLARE HEADLIGHT LAWS

List of States Which Restrict Beam of Automobile Lights to 42 in. Above the Level 75 ft. Ahead

The National Automobile Chamber of Commerce has made public a great deal of data which it has gathered on the subject of headlight laws. From this authentic material it develops that the following states have in force, or passed for going into effect in the near future, laws requiring that the beam of light from a four candlepower headlight shall not shine more than 42 inches above the level of the roadway at a distance 75 feet in front of the car:

California, Connecticut, Maine, Iowa, Nebraska, Nevada, North Carolina, North Dakota, New Jersey, New York, Ohio, Oregon, Utah, Vermont and Washington.

Dimmers, special lenses or some diffusing device is required in the following states: Delaware, Florida, Illinois, Indiana, Kansas, Maine, Michigan, Nevada, New Hampshire, New Jersey, Oregon, Ohio, South Dakota, Texas and Wyoming.

Authorities consider that lamps that do not throw a dazzling beam of light more than 42 inches above the road 75 feet ahead of the car, yet are visible 500 feet

ahead, will conform to the intent of the law, and lights meeting statutory requirements are found generally serviceable to motorist under ordinary conditions.

CLEVELAND CLUB LOSES FOUR PROMINENT MEN.

Death has recently taken four prominent members of the Cleveland Automobile Club.

Major Henry Souther, whose death occurred at Fortress Monroe, Va., Aug. 15, following an operation and malarial illness of only a week, headed the list. Major Souther was one of the pioneer engineers in the automobile field, having been engaged in motor problems since 1895, and was vice president of the Ferro Machine and Foundry Co. He was a member of the Council of National Defense and shortly after the nation entered the war he was commissioned a major in the signal corps.

O. P. Stehn, general sales manager of the Hydraulic Pressed Steel Co., died the same week as Major Souther.

An automobile accident near Massillon resulted fatally for W. H. Boardman, one of the founders of the Cleveland club.

Loftus Cuddy died while on a tour of New England.

WESTINGHOUSE GENERATOR FOR ARMY TRUCKS.

The Locomobile, Pierce-Arrow and Garford companies have awarded the Westinghouse Electric and Manufacturing Co. contracts for electric generators for their 1918 truck output. The generator to be used is the one designed to meet specifications of the United States government for military truck service. Close regulation without battery and only one wire from the unit are two new features of the Westinghouse outfit.

The Mercer Automobile Co., Trenton, N. J., has also placed contracts for the generator to be used in the 1918 Mercer cars, making its lights independent of the battery.



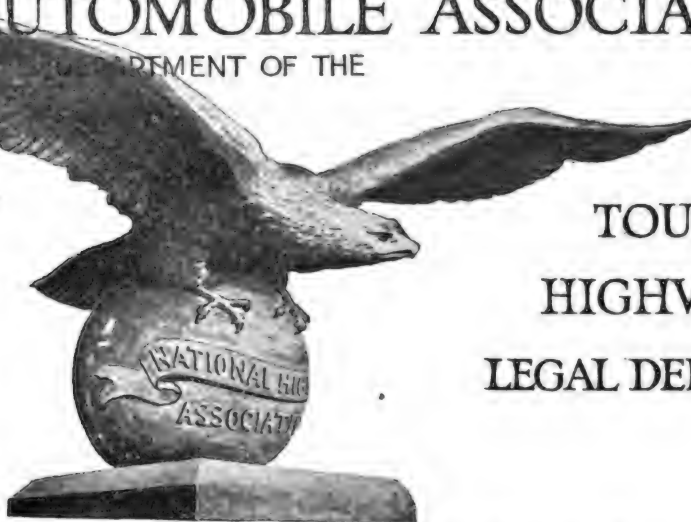
Elihu Root, Head of the Special Diplomatic Mission to Russia, Leaving an Overland Car at the Entrance of the Zemstvo Union, in Moscow, to Go Into a Conference with the New Russian Cabinet.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Some Work of National Automobile Association

Review of Valuable Services Rendered to Motorists in the Eight Months, January to August, This Year

IN A recent issue of this journal special attention was called to the splendid educational work of the past few years of the National Highways Association in its gigantic campaign for national highways and good roads everywhere; and as the National Automobile Association is the Massachusetts division and one of the 126 divisions or departments of this great patriotic organization, it may be not without interest to

its many thousands of members and the readers of this journal as well; to have a slight idea of the valuable services rendered to motorists by the National Automobile Association for the first eight months of the present year.

The primary aim of the association is to render direct personal services to each member, and the fee of \$5 per annum is the only charge for all the benefits of the association.

MASSACHUSETTS.

We again call the attention of our members to the fact that the Massachusetts Highway Commission is by special inspectors arresting motorists who do not in some measure modify the dazzling headlights upon their automobiles. These inspectors are being stationed in the most unexpected localities, and we would, therefore, suggest that all motorists make some attempt to comply with the law. Massachusetts authorities have failed thus far to approve any dimming devices, although Connecticut and New York and some other of the eastern states have endeavored to enlighten a bewildered public.

CARS IN MASSACHUSETTS.

There has been a gain of over 32 per cent. in motor car registrations in Massachusetts over the corresponding period of last year, namely, from January to August.

For the whole of 1916 there were registered 134,917 motor vehicles, including 18,194 commercial vehicles, as against 160,353 motor vehicles, including 24,025 commercial vehicles, for the first eight months of 1917.

The figures for 1916 and 1917 are as follows:

	1916	1917
Automobiles	121,034	160,353
Motorcycles	9,946	11,239
Manufacturers or dealers	1,914	2,335
Licenses (operator and chauffeur)	41,910	53,898
Operator and chauffeur renewals	182,950	109,672
Examinations	8,260	12,681

Including 16,756 commercial vehicles, 1916.
Including 24,025 commercial vehicles, 1917.

Legal Department Handles 363 Cases

First in importance is the Legal Department. It consists of the general counsel and assistants at the head offices in Boston, in addition to many other attorneys located in various cities and towns in the New England states.

All members have to do if the emergency arises for immediate action is to consult the association's attorney nearest to him. If a member wishes legal advice as to his rights and liabilities he should communicate with the legal department at the head offices of the association and immediate attention will be given to these matters.

During the period above referred to the general counsel and assistants have handled 363 cases in the inferior and superior courts of Massachusetts, 172 of which were entirely successful, 211 cases partially successful and practically all of these were disposed of in a manner sat-

isfactory to the members. Through this service many hundred dollars have been saved for our members.

Local counsel in various cities and towns have taken care of 78 cases, 43 of which being disposed of favorably to each member.

General counsel has received 735 requests for suggestions, advice and assistance from members dealing with legal matters, their rights and responsibilities. Four hundred and fifty of these requests related to accidents, 65 to repair bills, 31 to purchases of automobiles and the balance dealing with every conceivable kind of a subject in which an automobile or an operator was involved from the preparation of registration and licensing applications and local tax returns to the building of garages.

General counsel held 879 conferences with members relating to legal matters

affecting them, their operators or their motor vehicles. Scores of matters of civil nature have been settled or adjusted between members and motorists in general outside of court.

General counsel and assistants have

participated in the discussion before the Legislature of Massachusetts on all bills—some 36 in number, affecting motorists and motor vehicles, and have also taken a great interest with local counsel in legislation in other states as well.

Touring Department, the Red Road Book

The association has distributed free to every member a copy of its celebrated Red Road Book, containing hundreds of detailed motor routes and new maps covering all of the New England and eight adjacent states. This tour book is one of the most valuable publications which the association has presented to its members.

In addition to these books 1456 special tours, covering all parts of the country and Canada, have been mapped out for members contemplating particular journeys.

One of the beautiful eagle emblems of the association has been distributed free to each member. This emblem, designed specially for the association by the late Bela L. Pratt, one of America's

leading sculptors at the time of his death, makes a most artistic ornament to any automobile.

The Automobile Journal, containing from 50 to 100 pages of up-to-date, new and valuable articles dealing with every phase of motordom, has been sent free fortnightly to each member. The special editorial pages in this journal, devoted to some of the work of this association, have enabled members to keep fully, regularly and promptly informed regarding police activities, traps, new laws, regulations, traffic rules, roads under repair and detours, specially prepared and attractive motor tours, decisions, etc. In addition hundreds of our regular route cards, maps, etc., of the association have been distributed free to members.

Traps and Police Activities

Notes on Penalties Enforced for Transgression of Speed Laws, Non-Dimming of Headlights, etc.

MASSACHUSETTS.

Northampton. A trap is being operated to catch motorists who do not slow down and give a timely signal at the corner of King and Pleasant streets. Moreover, the police are generally enforcing the motor vehicle laws.

Rockland. An officer is watching for motorists at Mann's corner in this town.

This is on the road to Nantasket. Motorists are stopped irrespective of whether they are driving fast or slow.

Bridgewater. The police of this town are arresting motorists for failure to properly dim the headlights on their cars.

Boston. Columbia road. Many arrests are being made of overspeeding motorists on this boulevard.

Blue Hill avenue, at Mattapan. Metropolitan police are making many arrests in this vicinity not only for overspeeding, but for undimmed headlights and failure to sound horns.

East Boston. For failure to slow down and sound horns motorists in large numbers are being arrested at Saratoga and Austin streets. A trap is also being operated on Meridian street.

MAINE.

The new law of this state requiring the dimming of headlights is being very strictly enforced by the deputy sheriffs of various municipalities. Those officers now believe that they have been tolerant of ignorance and neglect long enough and will proceed against violators of other laws. They are convinced that

sufficient time has elapsed since the new law became operative for all motorists to equip their lights with dimmers or take such precautions to prevent blinding glare from their lights at night. We, therefore, suggest that motorists traveling in Maine take all necessary precautions to comply with the law requiring the dimming of headlights.

New York City. This city is now trying the "trap" system of checking motorists driving in various parts of the city at an unreasonable rate of speed. The "trap" consists of two traffic officers stationed two blocks apart, who take the motorist's time with stop watches. One of these "traps" has been set on Riverside Drive from 77th to 79th streets. If these traps work well they will be operated during the day time all over the city in place of motorcyclists and bicyclists patrolmen.

Silent Policemen.

Considerable complaint has reached us that many motorists disregard the instructions painted upon "Silent Policemen"—the wooden standards now placed at many street crossings in many of our cities. Many of these are erected by municipal ordinance and carry with them the force of law; some, however, are not set up by municipal regulation. However, we deem it best for convenience and safety that motorists should govern themselves according to the directions of these "Silent Policemen" and we trust that all our members at least will do so.

New York Parks Delight Motorists

2,000,000 Acres of Forest Preserve Include Many Scenic Spots Accessible in a Car.

No section in the whole world can show more beautiful forest preserve than New York state. Not only does this commonwealth excel in wealth, population and good roads, but also in acreage in state owned forest preserve parks accessible to motorists and it is the established policy to constantly increase this, \$10,000,000 being recently appropriated for land and \$7,000,000 more for highway improvement. As early as 1825 it was discussed by Governor De Witt Clinton. The first appropriation, however, was secured in 1872.

The state's forest preserve today extends over 2,000,000 acres of wild lands, valued at over half a billion dollars. The Adirondack region covers over 1,600,000 acres. The Catskill preserve holds over 125,000. Both of these regions furnish recreation to hundreds of thousands of tourists and campers from all sections of the country, and are located within five hours from New York City.

One of the recent acquisitions to these two preserves was made in 1910, when the widow of the late Edward H. Harriman presented to the state some 10,000 acres of land situated in Orange and Rockland counties, bordering along the Hudson river. Also a sum of \$1,000,000 was given for the purpose of preserving this park and extending its development along the famous river. This is accessible to motorists from New York City over the Fort Lee-Bear Mountain trail, the finest specimen of highway engineering in the world.

In addition to the Harriman Park, the Palisades Park Commission, acting with a commission similarly organized from New Jersey, was created to preserve and protect the scenic beauty of the mountain lands on the west bank of the Hudson extending from Fort Lee up the river. Private contributions of land and money amounting to over half a million dollars, with more than that sum received from the State of New York and New Jersey, have assured the completion of the work.

The third great park, known as the Highland Park, consisting of the Harriman and Palisades parks, extends the scheme from Fort Lee up along the west side of the Hudson river as far as Newburg. Private subscriptions exceeding \$2,000,000 have been received from individuals to develop this work, while the State of New York has offered a considerable amount.

SEATTLE MOTOR TRAFFIC.

An official traffic census taken in 1915 at seven points in Seattle, Wash., showed 17,568 motor driven vehicles as compared with 5160 counted in the census of 1911, an increase of 222 per cent.



National Highways are Necessary to Automobile

Full Development of Motor Vehicles' Utility and Efficiency
Depends on the Building of Good Roads Throughout Country

By CHARLES HENRY DAVIS.

WHEN the internal combustion engine, using gasoline as fuel, was first adapted to propelling road vehicles, there were set in motion the wheels of one of the world's vastest industries, which was destined to revolutionize all previously conceived ideas as to land transportation. History tells us that road vehicles employing mechanical rather than animal power for locomotion dates back more than 2000 years. Some of these crude and almost prehistoric ancestors of the modern automobile undoubtedly traveled over the celebrated Roman roads, which also were among the very earliest attempts at improved road construction.

On the other hand, it was not until less than a quarter of a century ago that there appeared the first real motor vehicle in the present acceptance of the term. From one to over three and one-half million during the short space of 25 years is a leap which the ordinary mind fails to grasp.

Never in the history of the world has there been recorded anything approaching such rapid strides in any other industry. In the year of the last census, 1910, the value of automobiles far exceeded that of such other indispensable manufactured products as agricultural implements, railroad cars, carriages and wagons, with a total of nearly a quarter of a billion dollars.

The Automobile and Good Roads.

As soon as the automobile became a proven success and it was found that it might venture with safety beyond the confines of the city, the fact became apparent that unless a comprehensive system of good roads were developed throughout the country the motor vehicle was bound to leave the greater part

of its utility and efficiency undeveloped. It was from a realization of this fact that the great movement for good roads, which is sweeping the country today, received its greatest impetus. As a result, it has been aptly said that the automobile has exerted the most potent influence on road building since McAdam. And this is as it should be, for we must make our progress in road construction keep pace with our improved vehicles of transportation. We cannot do away with automobiles and, therefore, we must build roads upon which they may travel with safety and comfort.

Interstate Trunk Line Traffic.

But the most important and revolutionary change brought about by the automobile has been the practical annihilation of state boundaries, due to the very greatly increased distances of road travel. Now that automobiles which can easily make 250 miles a day have come into general use, great interstate arteries of traffic have sprung up all over the country, which were unheard of in the days of the horse drawn vehicle. Thus it is easily understood how with these changed conditions we have outgrown the time honored system of placing the construction of all roads in the hands of local communities, and are entering upon a new era in which the national government must take charge of the construction and maintenance of those roads which are in reality continuous interstate routes.

Plans for Transcontinental Highways.

Many excellent schemes have been advanced at various times for the improvement of continuous stretches of certain interstate routes, some of them transcontinental highways; but eventually they all have fallen through, owing to lack of

co-operation along the line. As long as the control of all roads is in the hands of local communities, or even of states, this condition of affairs is bound to continue.

Each township, county and state which builds roads will invariably build them without reference to the work of any other community, and without thought of continuity of the interstate routes, which is so necessary to the proper development of our automobile traffic.

The Argument for National Highways.

On the other hand, no state or local community can justly be blamed for this attitude, for the foreign cars which tear its roads to pieces do not contribute a dollar to the construction or maintenance of the roads; so why should it build roads for use by foreign vehicles?

The only equitable solution of this difficulty and the solution which we are slowly but surely coming to, is to entrust the construction, maintenance and control of these interstate routes to the national government. When we shall adopt this solution we shall then have made an enormous stride in the direction of good roads everywhere.

There are a few people who still hold to the mistaken notion that national highways will place in the hands of the government a matter of purely local concern. We believe the facts above outlined have clearly demonstrated that roads, and particularly those roads which are now, because of the automobile, truly interstate routes, constitute a purely national concern. But to still further demonstrate this fact it may not be amiss to outline the general scope of national highways in their relation to existing state highways and county and local roads.

First, the national government should

construct a system of highways extending over the entire country and embracing those routes which are now, or will come to be, through routes of travel, and interstate in character. A map has been presented after a long and painstaking study of the needs of all parts of the country, gathered by a most thorough correspondence and personal investigation. The routes follow either the best existing roads or lines where the best grades and alignment can be secured consistent with serving the greatest number of people. The entire length measures only 50,000 miles (a little over two per cent. of our present total mileage), and yet over 60 per cent. of our entire population is directly served by these routes—the whole country really served.

However, it is not supposed that this location is perfect in all respects, and is put forth merely as a tentative scheme, calculated to promote discussion and thus aid in a final determination. But whatever final location and mileage are fixed upon it is essential that they should be built, maintained and owned by the national government, under the direction of a national highway commission.

State Highway System.

Similarly each state should construct a secondary system of highways which would embrace all the main intercounty routes and bind together all portions of the state. These state highways should be built, maintained and controlled by the state, under the direction of a state highway commission.

County Road System.

Again each county should take care of a tertiary system of roads which would bind together all parts of the country and act as feeders to the state highways. These roads should be built, maintained and owned solely by the county.

Town or Township Roads.

After these county roads there would still be left a few roads, purely local in character and generally with comparatively light traffic. These local roads, feeders to the county roads, should be taken care of by the town or township. Because of their light traffic—the heavy traffic roads having been taken over by nation, state and county—the cost of their construction and maintenance would not fall as a burden upon these local communities as it does under the present system, where such a large percentage, if not all of the roads, both through and local, have to be maintained by the local inhabitants.

The Result.

As a result of the fourfold system above outlined, there will be obtained a separate and distinct field of endeavor for national, state, county and township road officials; and, likewise, a certain definite object for national, state, county and township road appropriations. No one will encroach upon or be hampered by any of the others.

The automobile has thus far done more for the cause of good roads than any other agency. Should it not then give its unbounded support to national highways?

QUESTIONS OF SKIDDING LIABILITY

Massachusetts Decision Presents a Number of Interesting Points to Automobile Owners

Now that the season for skidding automobiles will soon be here again, it might not be amiss to present some of the views upon the subject of skidding by the Supreme Judicial Court of Massachusetts.

We find that in two actions recently decided, which were brought against a city to recover for the conscious suffering and death of the plaintiffs' interstate (hereafter called the plaintiff), alleged to have been caused by a defective condition of a highway, the evidence in these cases tended to show that the accident occurred in this manner:

The plaintiff, a milk man, was watering his horse at the fountain in the street between 8 and 9 o'clock on a misty morning, when an automobile carefully driven came upon the street, and by reason of the extremely slippery condition of its surface, due to oiling on the preceding afternoon by those in charge of the defendant's streets, began to skid, could not be controlled and collided with the plaintiff's milk wagon, injuring the plaintiff, and from which injuries he subsequently died.

There was evidence also that the defendant failed in the performance of its statutory duty to maintain the way reasonably safe for travel and permitted to exist a defect consisting of extraordinary slipperiness, in the surface of the street. Mere smoothness and slipperiness of a sidewalk may be a defect. Oil spread upon the surface of the street, thus rendering it unreasonably slippery, is in no wise distinguishable, so far as concerns the legal principle involved, from the Hyatt lights in issue in these cases.

Cities and towns, the court held, are not required by law to make special provisions in order to keep all their public ways at all times in condition for the safe passage of automobiles, bicycles and other mechanisms for travel newly devised and unthought of at the time when the statute imposing the general duty as to repairs of ways and liability for defects therein was enacted. But they are pledged to keep their ways reasonably safe and convenient for travel generally, having regard to all the circumstances. Automobiles are recognized by the law as a legal method of travel. Elaborate statutory provisions are made for their registration, for the licensing of those who operate them and for the management of them upon the public ways. It is common knowledge that at present in this commonwealth a larger number of people travel upon the highways in automobiles than in horse drawn vehicles. The care as to the repair of ways cast upon municipalities by the statutes has reference to all kinds of legitimate travel, including that rightly undertaken in automobiles. Although special provi-

sions for their safety are not demanded their presence cannot be ignored.

There was ample evidence of the due care of the one driving the automobile which struck the plaintiff's wagon. The mere fact that the automobile skidded does not show negligence. If the conduct of the driver of the automobile was cautious, then his intervention between the defect and the injury would not as matter of law break the direct casual connection between the injury to the plaintiff and the failure of duty on the part of the defendant.

And the court further states that the fact that the oil was spread upon a street under the direction of the defendant's superintendent of streets was important chiefly upon the question of reasonable notice to the defendant of the existence of the defect. It was of no consequence whether the defendant was responsible for his negligence or not. The liability of the defendant is found on its failure to keep its streets reasonably safe for travel and to remedy a defect likely to be dangerous.

That might be found to exist quite independent of its liability for negligence of its superintendent of streets. If the rain of the night intervened between the oiling of the street and the accident was a factor which created the danger, then it might have been found that the rain should have been guarded against by warning, sanding or otherwise.

Road Conditions

The following notes are taken from late reports received by this department regarding highway conditions in states designated.

NEW YORK HIGHWAYS.

Ulster County, N. Y. The Kingston road running from Kingston to Ashokan boulevard, which has been under construction for some time, is now completed and open to the public.

NEW JERSEY HIGHWAYS.

The Highway Commission of New Jersey is now directing that all freshly oiled highways in the state be immediately sprinkled with sand.

MASSACHUSETTS HIGHWAYS.

The highway between Pittsfield, Mass., and Albany, N. Y., is in splendid condition with the exception of one bad detour.

From Shelburne Falls to Greenfield the road is in very good condition.

From Pittsfield to Sheffield, over Jacob's Ladder, the road is in good condition, notwithstanding the enormous traffic along this attractive highway.

On the main highway between Boston and Worcester there is a bad stretch at Shrewsbury.



Paige Town Car Model Six "55," Distinctive New Closed Car Type, Selling for \$3230 f. o. b. Detroit.

New Paige Designs Are Disclosed

Features Include Mechanical Improvements in Car Bodies and Pleasing Accessories

Of four new designs of Paige enclosed cars the town car model six "55" is the most distinctive and reveals a luxury of design, appearance, equipment and finish only to be found on the very high priced cars and those of European design.

The town car type has long been conceded the most aristocratic in appearance of all motor car bodies. The top, as in the regulation type, only goes as far as the panels back of the driver's seat and the rear compartment is entirely enclosed, but the comfort of the driver has not been overlooked, top and side curtains being provided which readily attach to roof and windshield and give absolute protection in all weather conditions.

From the point of interior decoration the car is one of the most luxurious ever produced. The theme of the Kentucky Rose is carried out in the tapestry upholstery, the mahogany panels, on the toilet and smoking cases, on the lighting fixtures, on the handles and on the window regulators. The window shades are of silk and when drawn completely exclude the light from a roomy tonneau. The seat is wide, with a high back and extra deep upholstered sides, giving the maximum of comfort to the occupants.

Appointments and conveniences have been provided to satisfy the most fastidious owners. In a handy position there is a cigar lighter, ash tray, matches, light switches, speaking tube, pull-to handles, window regulators and panel mirrors. Large dome lights and rear quarter lights of sufficient power to brightly illumine the interior are also found in the town car.

Many mechanical improvements in the construction of these bodies are also incorporated in the new models, the doors being well supported, in perfect alignment to fit, cushioned against slamming and fitted with the finest quality of mo-

tor vehicle locks, which are light and positive in action. All windows are absolutely weather tight and operate so easily that a child can operate them. The enclosed models are finished in three different colors, Brewster, hazel brown and Paige blue.

The town car sells for \$3230 f. o. b. Detroit. The other Paige enclosed models on the "55" chassis, with prices, are as follows: Sedan, \$2850; coupe, \$2850; limousine, \$3230.

"DE LUXE" SEDAN BODIES FOR THE FORD CHASSIS.

The new "De Luxe" sedan body, the latest addition to the line of Ford bodies made by the Detroit Auto Products Co., Detroit, Mich., will undoubtedly prove as popular, if not more so, than the roadster, touring car and Victoria bodies

manufactured by this company, which have been on the market for some time.

W. E. Carpenter, general manager of the company, states that reports from their dealers already indicate that the demand for the "De Luxe" sedan body will be even greater than that for the open bodies, on which the factory has been oversold for some time. The new body was designed to meet the desire on the part of a large number of Ford owners to combine the economy and reliability of the Ford chassis with the comfort and appearance of the higher priced enclosed cars.

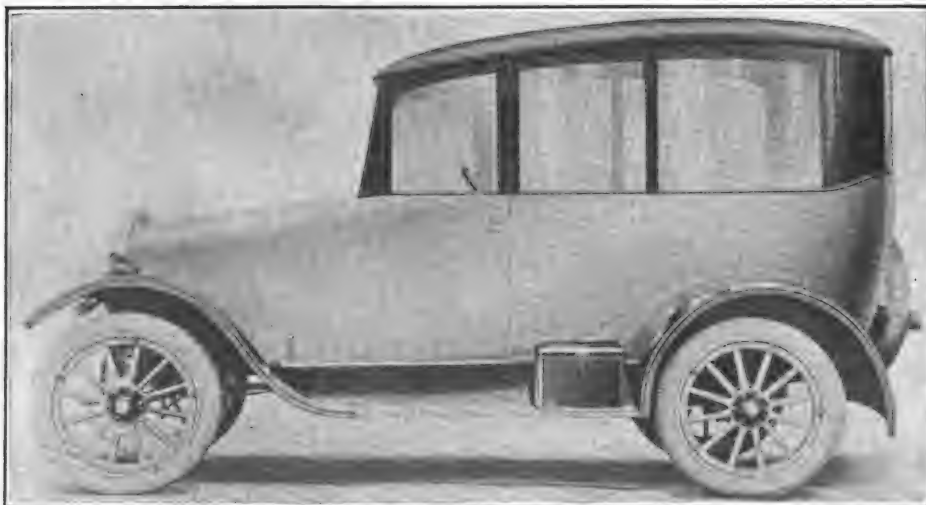
The Detroit Auto Products Co. has specialized in the production of special bodies for Ford cars and the quality of their product, which has been maintained by a staff of engineers, has developed the business into what is claimed to be the largest of its kind in the world. With the addition of the "De Luxe" sedan body to the line of open bodies, the roadster, touring and victoria, their dealers now have a complete line to meet the most exacting demands.

FAW 1918 ADVANCE LINE.

J. H. Faw, Inc., of 41 Warren street, New York, with a branch in Atlanta, Ga., are issuing their 1918 advance catalogue, which shows their extensive line of automobile accessories. It describes the specialties owned and manufactured by them, as well as the various lines they represent and distribute. They say that they are having an increasing demand for the "Fawco" brands of their own manufacture, including Oil Cock Wrenches, Lamp Electrifiers, Auto Crawlers and Ignition Wiring Assemblies.

BUFFALO DEALERS WILL HOLD CLOSED CAR SHOW.

The Buffalo Automobile Dealers' Association is making arrangements for a closed car show to be held in Elmwood Music hall in that city during the first week of October.



Much Discussed "De Luxe" Sedan Body for the Ford Chassis Made by the Detroit Auto Products Co., Detroit, Mich.



Although it is located less than 100 miles from Boston, in the White Mountains, in New Hampshire, in a region where thousands of visitors roam the wilds and woodlands each summer, few know of the existence of Lost River. This is partly to be accounted for by the fact that Lost River lies out of the beaten path and can be reached only by automobile or carriage. Still another reason for the small number of visitors in the past is that it was impossible to travel the ravines, clefts and caverns of the Lost River waterway owing to lack of ladders and paths. Something of the beauties and attractions of this almost unknown wonder spot in New England the Automobile Journal is able to convey to its readers through the courtesy of Mr. F. H. Tucker of Norfolk Downs, Mass., who furnished the pictures with which this touring article is illustrated. As an objective for a fall or summer tour this glimpse of charming and romantic vistas commends itself.—Editor.

WHILE it is one of the oldest sections of the United States, Northern New England has many extensive areas in its mountains and forests that are little known, even to its inhabitants, owing to the wildness of the surrounding country. One of the most noted of these places that has only recently been open to the inspection of the tourist is the Lost River valley, which is a geological wonder and is estimated to be over 25,000 years old. Once the river flowed in many times its present volume, and its bed and environing ravine, cut by its torrential and precipitous flow, show grotesque and interesting erosions of the rocks and sands.

Lost River subsided many years ago in its furious dash toward the sea and is today only a small stream, rising in

Kinsman Notch in the White Mountains. Through glacial upheavals and other pranks of nature its course is one of the most irregular traversed by any river in the world, the water disappearing from sight after flowing along above ground for a distance and later emerging again into the sunlight.

Ponderous boulders, worn into irregular shapes, many resembling familiar forms, mark its course, which has been made negotiable to the tourist by paths that have been blazed along its tortuous banks and by the placing of ladders and bridges at the difficult passages.

With the Thrill of Discovery.

At this time of year a tour to this



Paradise Falls, the End of the Trip, as It Is Impossible to Explore Further.

interesting spot will afford the motorist and his party a trip unexcelled in New England for interest, as well as accompanied by the thrill of discovery and those exhilarating benefits from the crisp autumnal atmosphere encountered through the beautifully wooded roads en route from Boston, or other starting point, into the White Mountains.

From Boston the route leads out through Cambridge, Arlington, Lowell, Mass.; Nashua, Manchester, Concord, Franklin, Bristol, Plymouth, N. H., to North Woodstock, as shown in the accompanying itinerary and map.

Historic and scenic interest is lively all along the route and especial delight in the surroundings begins once the suburbs of the Hub are well cleared. Pleasing views are presented from time to time as the tour progresses. The Pawtucket falls, at Lowell, were a favorite fishing ground of the Indians. The Pawtucket canal extends from the head of the falls to the Concord river, below the city, and, with its fall of 30 feet, affords excellent water power, turning the busy spindles of this thriving city.

Some Places Along the Way.

Nashua is passed in due time and at Manchester the Amoskeag falls on the Merrimac river are seen. These falls have a descent of 47 feet and, with the rapids above, afford a fine sight. On to Concord, the capital of the state, the way leads. It is a quaint and historic capital, given a pleasant embowered appearance by its abundance of shade trees. If the time be taken a splendid view may be obtained from the dome of the state house and a number of the public buildings are worthy of attention.

Franklin possesses more than passing interest from the fact that it was the birthplace of Daniel Webster. Further

along is Bristol, in the Pemigewasset valley, and two miles beyond is Newfound lake, with Sugar loaf mountain on the west shore and Crosby mountain on the east. A turn through West Plymouth and the tourist is in Plymouth, northwest of Lake Winnepesaukee, which was settled in 1764. The house where Daniel Webster made his first plea is still standing. Nathaniel Hawthorne died in this village. Plymouth is within easy view of the Franconia and White mountains to the north. Mt. Prospect, 2072 feet high, is a little to the northeast. A splendid outlook over the surrounding country is obtainable from this peak, including many famous mountains from Monadnock on the south to Moosilauke to the northwest. On its weather scarred sides are to be found a number of interesting features, notably the Miser's Cave, the Avalanche, the Cold and Boiling Springs. Osceola and White Face are toward the northeast, and just below

elers passing through the mountains and robbed them of their valuables after dashing their lives out with a bullet or club. This rendezvous, which is located in Shadow Cave, is called the "Counterfeiters Den," as these jolly knights of the road are also credited with having operated on an extensive scale in making spurious money.

Whether true or not these legends and lore add to the inspiration the traveler experiences when passing through this mysterious course, as he is immediately impressed with the ideal location and appointments of such a place from which to wage war upon society in general.

Flowing over a rocky bed the river from this point soon descends into recesses in the rocks that never have been explored. From where the river vanishes and again comes into sight its flow is erratic and precipitous, flowing first through the fissures in rocks or opens between boulders, dropping into cavernous beds, later to emerge again into the open.

As the traveler follows the course, first descending the ladders where the river disappeared, enormous boulders about the passage, of queer and uncanny shapes. This ravine or canyon is called the "Hall of Ships," owing to the resemblance that the various rocks bear to the different vessels, one giving the impression of a battleship's prow, while another is seemingly a replica of a schooner's stern and others take on bizarre formations that excite one's wonder. Further down the passage reached by another ladder the river is found again, flowing now through a large cavern in which so little light percolates that one must have a light

to see the river and explore the interior of the cave. This cavern is called the "Judgment Hall of Pluto" and at its further end, with the aid of a light, the river can be seen tumbling from its mysterious course out into the open again.

A great knife-shaped rock is encountered further on after descending and ascending a number of ladders and in just a position with this cleaver like monolith is another rock resembling a cutting block in



Shadow Cave, Lost River, Also Called the Counterfeiter's Den, Absolutely Dark Except When Lighted by the Guide's Birch Bark Torch.

form, and called "The Guillotine."

The "Forty Foot Crawl," deriving its name from the manner in which a tortuous passage of that length to negotiate it, is the tunnel that usually balks the more timid traveler. Many other places, the "Queen's Bower," "King's Chamber," "Cave of the Earth," "Elysium Land," "Paradise Falls," are reached before the topography becomes prohibitive to further explorations.

ITINERARY.

BOSTON TO CONCORD, N. H.

	Miles		Miles
Boston	0.0	Nashua, N. H.	41.7
Somerville	3.2	Thornton's	47.6
Medford	6.6	Reed's Ferry	51.1
Winchester	9.7	W. Manchester	58.9
Woburn	11.8	Manchester	59.7
Wilmington	17.0	Suncook	70.7
Lowell	27.3	Pembroke	72.5
N. Chelmsford	31.7	Merrimac R.	76.9
Tyngsboro	35.1	Concord	78.3

CONCORD TO NORTH WOODSTOCK.

	Miles		Miles
Concord	0.0	The Weirs	38.0
W. Concord	3.1	Meredith	42.7
Pennacook	6.2	Holderness	50.7
Boscawen	9.1	Ashland	54.7
Gerrish	12.8	Plymouth	60.6
Franklin	19.2	West Campton	67.3
Tilton	22.3	W. Thornton	74.2
Winnisquam	28.8	Woodstock	78.0
Laconia	31.6	N. Woodstock	81.8
Lakeport	33.3		



Squam range, to the east, is Squam lake, island dotted and unusually picturesque.

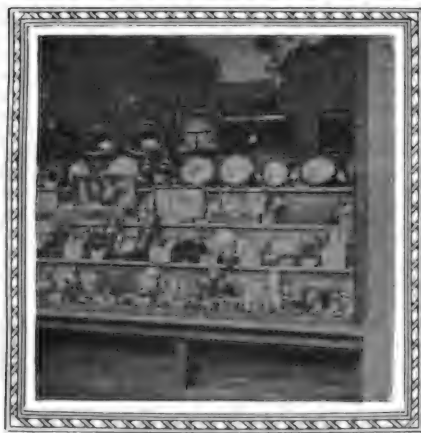
Far up in the Mountains.

Approaching Woodstock a very fine view of the Franconia mountains is obtained ahead of the traveler.

From North Woodstock the tourist turns westward to Kinsman Notch in the White mountains of New Hampshire, where there is an entrance to the Lost River. This section, of course, has many legends connected with history, including one to the effect that once upon a time it was the base of operations of marauding highway robbers who set upon trav-



Lost River, Which Rises Near Kinsman Notch, New Hampshire—One Point Where the River Flows Above Ground for a Short Way.



Accessories Department



THE SPEEDERATOR.

A most unique accessory for the Ford car has just been put upon the market which would seem to revolutionize the Ford car control. The device combines a foot accelerator with an automatic controlled advance and retard for speed changing. It eliminates the necessity of any and all hand operation of the steering post throttle and automatically idles the engine in changing speed. When low or reverse clutches are engaged the engine is supplied with more gas automatically and speeded up. As soon as these clutches are disengaged the gas is automatically cut off, preventing the racing of the engine, and making the change from low to high, which is so difficult for amateurs an easy matter.

In addition to the automatic feature is provided a foot throttle or accelerator, which renders driving convenient and identical with high priced car methods of control.

Manufactured by Detroit Starter Co., Detroit, Mich. Price \$2.85.

GIANT SEARCHLIGHT.

Because of the many conveniences afforded the call for a spotlight or searchlight is continually growing. For this reason the Giant Searchlight has been designed. This light is made of steel, finished in dull black enamel and fitted with a brass, silver plated over nickel reflector, scientifically laid out to give the best light under all conditions, and a rear view mirror if desired. When fitted with a nitrogen bulb and properly focussed, it is said to give enough light to enable one to see guide boards, num-

bers, etc., at practically any distance that the eye could read in daylight.

The bracket is made of malleable iron and designed with a universal joint so that the light beam can be directed in any direction. The light is controlled by a single point switch contained in the handle.

Manufactured by Culver-Stearns Mfg. Co., Worcester, Mass. Price upon request.

THE COPLEY PRIMER.

The Copley Primer has been designed to meet the demand for a perfected, dependable method of instantaneous starting of cold engines. It consists of a pull knob which may be mounted either on the dash or at the front of the car and the primer body which is connected with the intake manifold. The primer is fitted with a plunger, which normally is closed. When the knob is pulled a venturi passage in the plunger registers with an automatic air intake valve and the suction of the engine as it is cranked draws air

through the valve and plunger across a small gasoline inlet. Due to the fact that the venturi passage is small and the suction great, the air is drawn across the gasoline stream at a tremendous velocity, breaking up the fuel and forming a perfect explosive mixture containing a certain amount of gasoline vapor and air.

The manufacturers claim that when this device is installed the engine can be started instantly, regardless of temperatures, and that so perfect is the mixture that the engine will continue to run without the help of the carburetor.

Manufactured by Bay State Pump Co., 100 Purchase St., Boston, Mass. Price \$5.

GAS PEP.

The present day gasoline contains many of the lower test elements that were formerly to be found in kerosene, and for this reason it is not so highly explosive as was the gasoline of previous years. To supply certain explosive properties has been the problem which many automobile experimental men have tried to solve. Gas Pep is said to offer a solution to this problem, since it supplies certain elements necessary to make gasoline more efficient. The manufacturers claim that this compound, when used in gasoline, results in more power and a smoother running engine. Gas Pep is put up in crystalline form and is guaranteed to contain nothing that will result in damage to the engine. One teaspoonful of the crystals dissolved in five gallons of gasoline is the proportions used in energizing the fuel.

Manufactured by the Nitrated Chemical Co., 112 N. Front St., Kingston, N. Y. Box containing enough for 150 gallons of gasoline \$1. Agents write for proposition.



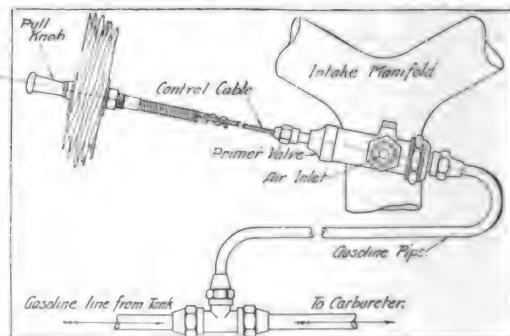
Culver-Stearns' Giant Searchlight.



Two Types of Culver-Stearns' Searchlight Clamps.



The Speederator Applied.



The Copley Primer.

MOSCO VALVE GRINDER.

Every repair man realizes that to get good results valves must be ground into place properly. This means that the valve be turned back and forth and complete rotations carefully avoided. This operation requires both considerable skill and much patience. To accomplish this operation the Mosco Valve Grinder has been designed. The workings of this device is extremely simple. As the larger part of the grinder is held in place the handle at the side, which is attached to a chain coiled on a pulley inside the casing, is pulled slightly. This motion imparts a rotating motion to the valve tool and the makers claim a noticeable increase in valve grinding time. The device is fitted with two tools, one standard, the other for Ford valves.

Manufactured by Motor Specialties Co., Waltham, Mass. Price \$1.75.

PENNOCK HEADLIGHT TILTER.

A new solution for the headlight problem is given in the Pennock headlight tilter, a device for controlling the headlights of practically any make of car. The apparatus consists of a pair of headlight brackets mounted on the mudguards and connected with a foot pedal in such a manner that by pressing upon the pedal the brackets are tipped forward. With the pedal released the headlamps are in normal position, throwing the beam of light straight ahead. For driving in cities or towns the lights may be locked so that the beam does not rise above the height prescribed by law. When meeting another automobile the lights may be depressed so that the rays do not dazzle the passing motorist, yet illuminate the road ahead.

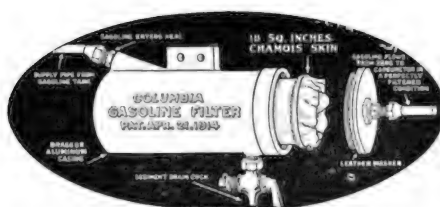
For illuminating the road when topping a hill the tilting device makes the lamps exceptionally convenient. Beyond the fitting of the foot pedal no alterations to the car are necessary.

Manufactured by the Specialty Mfg. Co., Minerva, O. Price for Fords \$5. For other makes of cars write for prices.

COLUMBIA GASOLINE FILTER.

The embarrassments attendant upon poor and unfiltered gasoline is fully realized by motorists. In order to function properly the carburetor must be supplied with pure liquid, water or dirt fill up the intake valves and cause many troubles. The Columbia gasoline filter is designed for insertion in the gasoline line at any point between the tank and the carburetor, preferably near the latter, and is so arranged that all of the gasoline passing through it is thoroughly strained, both through chamois and wire gauze. Due to its construction the straining surfaces are large and efficient. The device is easily cleaned and may be applied to any automobile.

Manufactured by Columbia Gasoline Filter Co., Inc., 30 Beach St., Boston, Mass. Price, \$5.



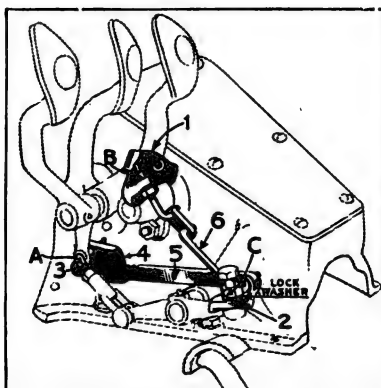
Columbia Gasoline Filter.



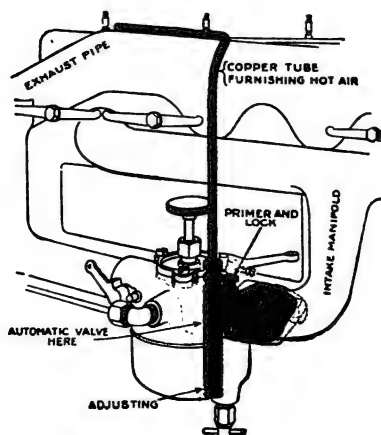
Pennock Headlight Tilter.



Howe Counter Display.



Ford Automatic Simplifier.



National Mix-O-Lock.

HOWE COUNTER DISPLAY.

That the counter display is an aid in selling goods has been demonstrated in many cases. It acts as a memorandum to the customer, and, if the display is attractive, frequently "persuades" the buyer into making an unexpected purchase. The Howe display, illustrated herewith, is attractively lithographed in red, white, blue, gray and black, and upon it is provided a space to show styles of the standard size Howe searchlights, with and without rear view mirror, and also the Howe Junior, a single shell popular priced model. In addition to the light display are spaces for six of the special Howe clamps by which the lights may be attached to various types of windshields. This attractive display stand for counter or window display, together with a set of windshield clamps, is furnished free to Howe dealers.

Manufactured by Howe Mfg. Co., Michigan Ave., Chicago, Ill. Dealers write for prices and terms.

NATIONAL MIX-O-LOCK.

A combination auxiliary air mixer, a priming device and carburetor lock is introduced under the name Mix-O-Lock. This device consists of a gasket shaped casting which fits between the carburetor and manifold. Leading to the gasket is a long copper tube, which is carried along the exhaust manifold and through which hot air is drawn into the manifold. The amount of air may be adjusted for the best running. Fitted upon the top of the gasket is a primer plug, and when the plug is removed the excess air which is admitted effectually prevents the starting of the engine until the plug is returned.

The manufacturers claim a gasoline saving of from 25 to 50 per cent. when this device is used, owing to the more efficient combustion of gasoline and a better mixture.

Manufactured by the National Motor Supply Co., Painesville, O. Price \$2.

FORD AUTOMATIC SIMPLIFIER.

The Ford Automatic Simplifier, as the name indicates, is a device for making the driving of the Ford car the simplest possible. When this device is attached the entire control, so to speak, is in the brake pedal. With the car in motion it is only necessary to apply the service brake and the car will be stopped, the clutch is automatically brought to neutral and so remains until released. Low and high speeds are attained, as at present, by the application of the clutch. When this device is in use it is said that it is impossible to "kill" the engine. Since the clutch is at neutral as soon as the service brake is applied, it is impossible for the car to move forward because of clutch engagement when engine is being cranked.

Manufactured by Marion Metal Products Co., Marion, Ind. Price upon request.

WARNOLA WARNING SIGNAL.

A horn with a distinctive note that does not alarm, yet serves as a warning signal, is illustrated herewith. This device is built to satisfy the demand for a different warning, something that would be effective in the city where everyone was accustomed to ordinary horns, and also in the country where the note must be far reaching. No diaphragms or springs are used in the horn, the note being produced by the rush of air from a piston working in a double end cylinder through reeds. Short, sharp blasts may be given by a quick movement, or a long distance covering signal produced by a slower plunge of the piston. The device is made in two styles, numbers one and two.

Manufactured by Warnola Manufacturing Co., 73 Wooster St., New York. Price for No. 1, \$7.50; No. 2, \$5.

COLE GASOLINE GAUGE.

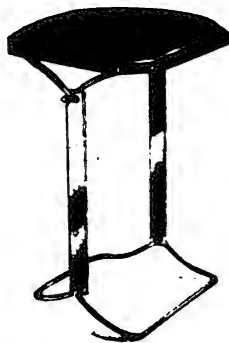
No matter what car is being driven the driver at some time or other is apt to neglect the filling of the gasoline tank. This usually means a delay and possibly a long walk for more fuel. This trouble is said to be eliminated when the Cole Gas Gauge is used. This device is designed for any gasoline tank with the exception of those in cowl and operated by air pressure. It is made in two parts, the first or float part, is attached to the gasoline tank; the second or indicator, may be attached to the dash, or beside the wheel and visible at all times. It makes a handy device for checking up the car mileage with the gasoline consumed, and is an assurance that the gasoline purchased is full measure.

Manufactured by the Halewick-Muehlhausen Co., 2350 West Austin Ave., Chicago, Ill. Price \$5 for any make of car.

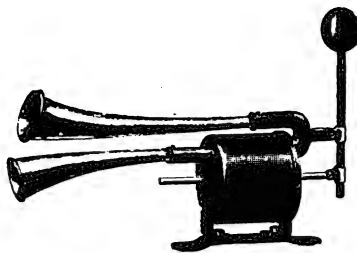
NATIONAL TELESCOPE PUMP.

Proper tire inflation pays big dividends and, conversely, poor tire inflation means big expenses. The average car owner pays but little attention to his tires so long as there is air in them, since the labor involved in using the hand pump is so great.

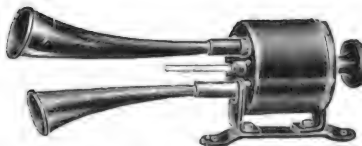
To make tire pumping easy and to utilize the power of the engine for the pur-



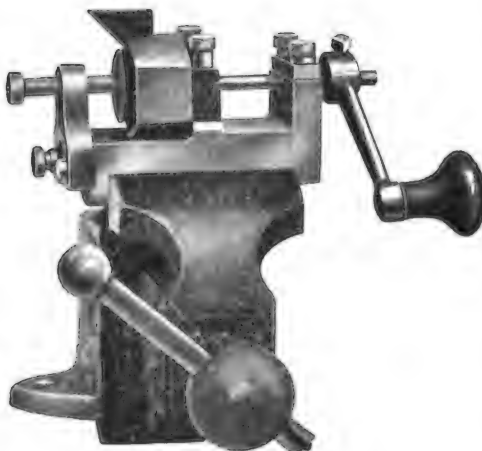
Buffington Folding Stool.



Warnola Warning Number One.



Warnola Warning Number Two.



Sioux Valve Refacing Tool.

pose, the National telescope pump has been designed. This device is fitted with a steel piston which is constructed with rings, similar to an engine piston, and so designed that only fresh air is forced into the tire. It is screwed into the spark plug hole or into the priming cup hole, where it may be left permanently when a shut off is used. With the device is furnished a woven cover air hose 12 feet long, a dial pressure gauge and fittings. The shut off comes extra.

Manufactured by the National Motor Supply Co., Painesville, O. Price \$9. Shut off valve \$1.25.

UPHOLSTERED FOLDING STOOLS.

The Buffington folding upholstered stools are made with seats upholstered in imitation leather, black or maroon, tufted with hair and measuring 11 inches square. The seat is made of three ply, one-half inch veneer and the manufacturers state that they will not warp or break.

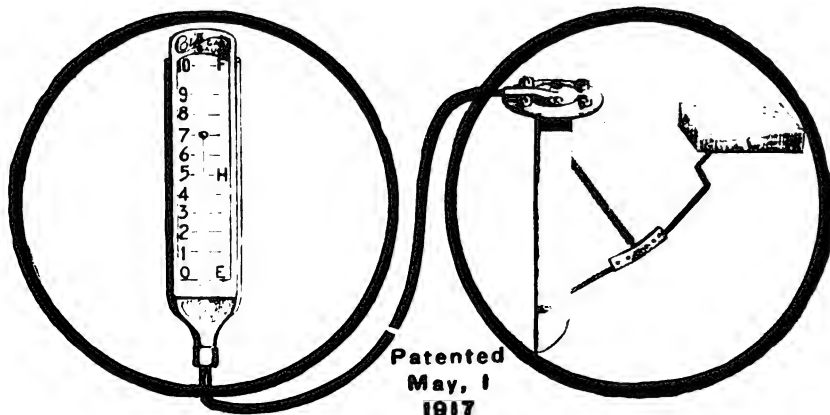
Manufactured by C. A. Buffington & Co., Berkshire, N. Y. Prices upon request.

SIoux REFACING TOOL.

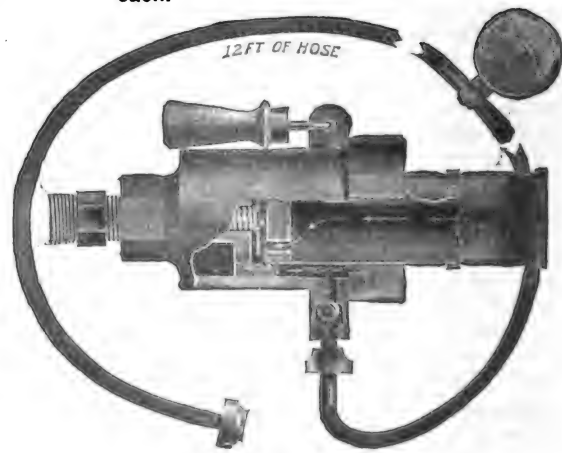
After a certain number of grindings the grinding process for fitting valves to their seats is inefficient, for the reason that the valve and seat surfaces are uneven and contact at but a small portion of their areas. When this happens the best repair is complete refacing of the valve by cutting or reseating of the seat, or both. The tool illustrated is designed for refacing the valve and is designed for use with any valve of standard type, that is, with 45-degree face and up to three inches in diameter.

For valves of 30 or 60-degree faces extra cutters are obtainable. The cutters are made of tool steel, hardened, tempered and cut to the correct angle. The manufacturers claim that no experience is necessary for operating the tool and that finished jobs are obtainable in a surprising short time, even by inexperienced workmen.

Manufactured by Albertson & Co., Sioux City, Iowa. Price \$6 with one 45-degree cutter. Extra cutters, 75 cents each.



Cole Gasoline Gauge and Tank Attachment.



National Telescope Pump.

*First Ford**Accessory Show Held*

Officers of the National Exposition for Ford Accessories and the Coliseum, Chicago, Sept. 22-29. On the Left: President, J. E. Duffield, General Manager and Treasurer Bailey Non-Stall Differential Co.; Vice President, Charles Johnson, General Sales Manager Maltby Auto Specialties Co., Detroit, Mich. Centre, H. V. Buelow, General Manager of Exposition. On the Right, Treasurer B. L. Gray, Gray-Heath Co., Chicago, Ill.; Second Vice President, H. S. Irving, Vice President Advance Auto Accessories Corp.

THE National Exposition for Ford Accessories opened in the Coliseum at Chicago Sept. 22 with a large crowd in attendance. It is the first exhibition of its kind ever held and includes the display and demonstration of not only hundreds of accessories manufactured exclusively for the Ford car, but also attachments designed for use with Ford chassis and parts and bodies used in the reconstruction of the Ford for business and pleasure purposes.

While the average Ford owner would not even suspect there were so many hundreds of accessories and so much equipment that could be used in improving his car or in converting it to other than pleasure purposes, he is readily convinced after a short visit to the exposition that practically all the goods exhibited are manufactured to serve a useful and serviceable purpose and will in one way or another increase the value of his car as a passenger or business vehicle.

The Coliseum has been decorated beautifully, the decorative scheme employing the national colors in red, white and blue canopy beneath the ceiling. All the booths are white with green and gold trimmings and in the aisles golden fountains prove highly ornamental in setting off the special exhibits.

The exhibitors at the exposition from Chicago, Ill., include the following: Chicago Pneumatic Tool Co., Nator Equipment Co., Hercules Buggy Co., Wire Wheel Corporation of America, Grant Wire Wheel Co., The Reliance Co., Mechanical Belt Co., Perry Auto Lock Co., Maltby Auto Specialty Co., Simplex Manufacturing Co., H. G. Paro Co., Essenkay Products Co., Ahlberg Bearing Co., K. D. Lamp Co., The Zinke Co., Gray-Heath Co., Shurnuff Manufacturing Co., S. C. Johnson & Son, Walker Ke-Les Lock Co., Metal Specialty Manufacturing Co., W. H. Howell Co., Sprague Manufacturing Co., Schlesinger Redburn Co., Brown Calne Co., American Machine Products Co., Hudford Truck Co., Axleford Truck Co.,

Guarantee Motor Truck Co., U. S. Auto Supply Co., Kerosene Burning Carburetor Co., Fouts & Hunter Co., Atlas Specialty Manufacturing Co., Bear Manufacturing Co., Naber Shock Absorber Co., White Star Refining Co., Ehrman Tire and Rubber Co., National Wire Wheel Co., Auto Accessories Manufacturing and Sales Co., D. & D. Co., Instant Heater Co., U. & J. Carburetor Co., Defender Auto Lock Co., Simplicity Wheel Co., Swedish Crucible Steel Co., American Steel Supply Syndicate, Snideman Standard Tire Valve Co., Willard Co., Standley Skid Chain Co., Belt Auto Indemnity Association, L. & B. Truck Manufacturing Co., The Pan-American Rubber Co., General Patent Manufacturing Co., Ever Ready Truck Co., Lanham Starter Co., A. A. Lawder & Sons, Inc., The R. & R. Manufacturing Co., Security Auto Lock Co., Hand-D-Dim Co., Tri-Continental Corporation, Dayton Wire Wheel Co., Jefferson Electric Manufacturing Co., Detroit Auto Products Co., Advance Auto Accessories Corporation, Bailey Non-Stall Differential Corporation, Nelson Manufacturing Co., Kerosene Carburetor Co., Auto Remodeling Co., Peerless Spark Plug Co., Smith Form-A-Truck Co., Consolidated Utilities Corporation, Ford Seven Bodies, Redden Motor Truck Co., Illinois Gear and Radiator Works, Stahl Rectifier Co., Osgood Lens and Supply Co., William V. Hughes, New Starter Co.

Exhibitors from other cities are as follows:

Elka Manufacturing Co., San Francisco, Cal.; Pennsylvania Clock Co., Jeanette, Pa.; Carsweld Hammond Manufacturing Co., Boone, Ia.; Commercial Car Unit Co., Philadelphia, Pa.; Jensen Kohler Manufacturing Co., St. Charles, Ill.

Several of the exhibitors are showing a varied line of manufacturers' products. The Zinke Co. is exhibiting products of the Indiana Lamp Co., Milwaukee Auto Engine and Supply Co., Romort Manufacturing Co., Hastings Manufacturing Co., Ewald Manufacturing Co., Chicago Rawhide Manufacturing Co., National

Manufacturing Co., B. & E. Lock Co., Kales Stamping Co., A. S. Brock Rubber Co. and Champ Spring Co.

The Gray-Heath Co. is exhibiting products of the Bill Automatic Spark Retarder Co., L. B. Halladay Co., Motometer Co., X-Laboratories Co., Outlook Co., New York Coil Co., Continental Piston Ring Co., N. A. Petry, Hanson Mfg. Co., Barcolo Manufacturing Co., Standard Speedometer Co. and Hall Thompson Co.

H. G. Paro Co. are displaying products of Heinzelman Bros., Auto Accessories Co. and Ekern Bros.

N. A. A. J. MEETING AT FRENCH LICK SPRINGS.

The members of the National Association of Automobile Accessory Jobbers at their autumn meeting, held at French Lick Springs, Ind., received a statement from their national commissioner, William M. Webster, on the subject of the indictments recently brought by the government against the organization and some of its members.

After hearing Mr. Webster's statement of conditions and declarations that the association had worked in harmony with the government, its new business laws and in cooperation with the Department of Justice, the members cast a vote of confidence in the commissioner and other officers and authorized the raising of a fund of \$50,000 to defray expenses of the legal action necessary in disproving the government's charges.

A most important action taken at the meeting and one that will be widespread in its influence for betterment in the trade, was the inauguration of a campaign of education among dealers to encourage them to adopt the more modern business methods and improve their condition. This was suggested in a report of the committee on assisting the trade and the members unanimously voted \$7500 to carry out the campaign for one year.

THE USED CAR MARKET STRONGER

Current Values Proclaim a Powerful Absorption of Vehicles as the War Affects Conditions

THE used car market in New England and New York City shows a much stronger tone than during the preceding month, despite the fact that the season is approaching when the largest number of motorists abandon their touring until spring. At this time in previous years the offerings of used cars have always been the heaviest, but this year there are many influences at work which have been responsible for the failure of this rule to work.

Thousands of used cars are being converted into commercial vehicles with the truck forming attachments and all indications point to an even greater movement in this direction, as there is a deep-seated belief that the truck makers, swamped with government and foreign orders, will not be able to cope with the demand. The general advance in the price of new passenger cars has also been a powerful factor in deterring owners from disposing of their old cars as in past years. Many manufacturers have emphasized the possibilities of a passen-

ger car shortage owing to the demands for materials for war work, and it is only natural to expect that the tendency will be in this direction if the war continues long, as it has so developed in England and France.

While not a tangible factor, to which the demand can be traced directly, the fact of general and unprecedented prosperity throughout the country is probably the real basis of the strength in the second hand car market. In most states the registration figures for the first six months of the year were equal to the entire registration for 1916, showing that while a year ago the statisticians were figuring to show the point of saturation, individual wealth has been so greatly enhanced that cars are today sold to people who a year ago, yes, six months ago, were not included among possible prospects. If business is maintained at its present enormous volume the limit of sales is indeterminable. Examples from the used car columns of the public prints are given herewith:

NEW YORK.

1917 MARMON CHUMMY ROADSTER.
1917 SINGER TOURING.
1917 REO SEDAN.
1917 ROSS "8" TOURING, \$850.
BRAND NEW SCRIPPS-BOOTH COUPE: big discount.
BRAND NEW SCRIPPS-BOOTH ROADSTER: big discount.
1917 OVERLAND COUNTRY CLUB. Like new.
1917 MITCHELL TOURING.
1916 MERCER RUNABOUT.
1916 FRANKLIN LIMOUSINE.
1916 CHALMERS, \$625.
1916 KISSELKAR; Victoria brougham.
1916 HUDSON CABRIOLET.
1916 BUICK LITTLE "6."
SERIES "17" STUDEBAKER; 6 cylinder.
1916 CADILLAC "8."
1916 DODGE TOURING, \$525.
Time Payments Arranged.
Trades Considered.

NEW YORK MOTOR CAR EXCHANGE,
237 West 55th St.

1917 STUTZ BULLDOG SPECIAL.
1917 HUDSON SPECIAL RACEABOUT.
1917 PAIGE SEDAN.
1917 LIBERTY TOWN CAR.
SCHOONMAKER & JACOB.
1700 Broadway.

RENAULT SPECIAL BOAT ROADSTER; latest importation.
CADILLAC 1917 SEDAN; wire wheels.
STUTZ 1916 BEARCAT; wire wheels.
S. G. V. 1915 FLEETWOOD ROADSTER.
MARMON 1916 CLOVERLEAF.
BURRELLE.
1704 Broadway, Corner 54th.

At Lowest Prices in City.

1917 WINTON LIMOUSINE; run 5000 miles; like new.
1917 CADILLAC TOURING; 7-passenger; all covers, bumper; run 1200 miles.
1916 STUDEBAKER; excellent condition.
1916 REO TOURING; 5-passenger.
1915 BUICK RUNABOUT.

1915 PACKARD 3-38 TOURING; 7-passenger.
1914 PIERCE-ARROW; overhauled and painted Brewster blue.
1913 MERCER RUNABOUT; Bosch starter and lighting system.
1912 MERCER SPEEDSTER.
GOTHAM AUTO EXCHANGE.
1694 Broadway.

COLE 1916 8-cylinder, 7-passenger touring car; newly painted.
COLE 1916 Big Six, 7-passenger touring car; Westinghouse shock absorbers; newly painted.
COLE 1915 8-50, 7-passenger touring car; newly painted.

The above cars are all equipped with modern improvements, are all in good operating condition and the prices are reasonable. The cars are worthy of examination. We will accept your present car in trade.
COLT-STRATTON CO., USED CAR DEPT.
1764 Broadway, at 57th St.

PACKARD AUTO EXCHANGE.
10 West 60th St.
(Two Doors from Broadway.)

PACKARDS.
1917 "2-25" Clover Leaf, 4 passenger.
1916 "1-25" touring, 5 and 7-passenger.
1915 "3-38" touring, 7-passenger.
1912 "30"-48" touring and landaulet.
Also
1915 STUTZ RUNABOUT.
1915 and 1914 S. G. V. closed.
1914 FIAT touring, 5-passenger.
FIAT racers, special.
Liberty Bonds Accepted in Payment.

ATTENTION, CONSERVATIVE BUYERS.
1917 BUICK "little 6" touring, like new.
1916 HUDSON Sedan, perfect condition.
1916 PACKARD twin 6 town car.
1916 DODGE Touring, 5-passenger.
LANCIA 5-passenger touring, wire wheels.

Many Others.
R. S. IRELAND.
1648 Broadway. Phone Circle 3249.

1917 PACKARD; chummy roadster.
1917 STUTZ; bulldog; special; wire wheels.
1913 PIERCE; 38 landaulet.
RENAULT; six-cylinder; late limousine.
PIERCE 66; Brewster landaulet.
1914 ISOTTA; latest 20; town car.
1913 LANCIA; 30 touring.
1917 CADILLAC; limousine.
1914 PIERCE; 38; limousine.
1914 PIERCE; 38; 5-passenger.
SIMPLEX; 38; Springfield body.
1914 MERCEDES; 25; limousine-brougham.
RENAULT; 14-20; limousine-brougham.

ROSKAM SCOTT CO.
1896 Broadway (63d).

BOSTON.

1915 JEFFERY Touring, \$350; electric self-starter and lights and in the finest possible mechanical condition; all fine shoes and original paint is perfect; call at once for bargain.
1917 MITCHELL Touring, \$775; has had very little mileage and excellent care and looks and runs like a new car; all fine shoes and original paint perfect; call for fine trade.

1916 DODGE Runabout, \$525; this popular light runabout is an exceptional trade, as it has always been used by a young lady and only driven few hundred miles; fully guaranteed; call at once.

1916 MAXWELL Touring, \$325; has had very little mileage and excellent care and looks and runs like a new car; all fine shoes and paint is new; call for fine light car.

1917 VELIE CABRIOLET, \$850; cost \$1600; only run 1200 miles by owner, who sailed for France Saturday; this is a perfect car and is the positive reason for tremendous sacrifice.

1916 CHALMERS Touring, \$475; model 40; thoroughly overhauled and repainted and in finest condition throughout; seats 7; suitable for family use or renting purposes.

1914 PACKARD Limousine, \$900; has just been thoroughly overhauled and repainted and is in finest condition throughout; has always been used private and had excellent care; call for bargain.

1916 OVERLAND Touring, \$375; like new throughout; always used by elderly couple, who only run it Sundays and holidays; tires, paint, etc., perfect; guaranteed.

1915 VELIE, 5-passenger, \$300; Gray & Davis electric self-starter and lights and in finest condition throughout; cost \$1800 and is a powerful, easy riding family touring car.

1916 BUICK RUNABOUT, \$600; light six model; mechanically perfect; inexpensive to operate and very powerful; 5 good shoes and paint excellent; climb any hill and runs quiet; guaranteed.

1916 PULLMAN Touring, \$350; this fine light touring car has electric self-starter and lights; all practically new shoes and is in finest mechanical condition; original paint perfect.

STEARNS Coupe, \$900; late model; cost \$4500 and seats 4; a fine high grade, all-year-round car that is readily worth \$2000 now; don't miss this one.

1917 SAXON Touring, \$550; this fine light six-cylinder car is practically new and is only offered at this low price to insure immediate sale; fully guaranteed and demonstrated.

1916 CHEVROLET Runabout, \$400; Royal Mail model; just been thoroughly overhauled and repainted and has all brand new shoes; a fine light runabout; inexpensive to operate.

1915 BUICK TOURING, \$450; model C-37; cost new \$1385 and has every possible extra; all good shoes and original paint; is in excellent condition; powerful, speedy and quiet running; call for bargain.

1917 STUDEBAKER Touring, \$550; 6-cylinder.

GEORGE GROW.
321-323 Columbus Ave., Boston.

1916 MERCER Touring; 2272 6-passenger; new cord tires; newly varnished; car used in all 6500 miles; practically new.
 1916 FIAT Touring; new body, self-starter and electric lights, small motor, very reliable and fast; look this car over.
 All-Weather car complete; 1917 HUPMOBILE Sedan; excellent family all-weather car; newly varnished; car guaranteed.
 1916 REGAL Touring; refinished extra small touring; very fast.
 1917 OLDSMOBILE; 8-cylinder touring; very snappy; car perfect.
 Series 1918 MAXWELL Touring; nearly new.
 1917 MAXWELL Touring; used 3000 miles; looks and rides like new.
 1917 ENGER Touring; twin six; nearly a new car; factory guarantee.
 All-Weather Runabout; 1914 CADILLAC Coupe; had the best of care; used by private family with chauffeur; car guaranteed.
 All-Weather Car; 1917 CADILLAC; Brougham; used 500 miles; guaranteed; chance for high grade car.
PARK SQUARE USED CAR CO.
 12 Columbus Ave., Motor Mart Bldg.

1917 HUDSON Super Six limousine; in excellent condition.
 \$800—1917 MITCHELL Touring; seven-passenger.
 \$800—1917 DAVIS Six Chummy Roadster; only been driven 1200 miles.
 \$1250—1916 HUDSON Super 6 Sedan; in the finest possible condition; has two extra tires and rims.
 \$550—1916 OVERLAND; Willys-Knight Roadster with slip cover on seats and many extras.
 \$800—Special built racing car; 85 miles an hour; has wire wheels and is fully equipped.
 \$400—1916 PULLMAN; chummy roadster; excellent condition and fully equipped.
 \$550—1916 OLDSMOBILE Roadster; in A 1 condition.
 \$400—NATIONAL Racy Type Roadster; overhauled and newly painted.
 \$450—CLEMENT-BAYARD; six-cylinder touring; shaft drive; cost \$7000 new.
 \$275—1915 FORD Town Car; in good condition.
 \$165—METZ Racy Type Roadster; good condition.
 \$285—Three 1916 FORD Touring cars; in good condition.
 \$300—1916 FORD Delivery; panel top body.
 \$435—STUTZ Touring car; in A 1 condition and fully equipped.
 \$250—1915 FORD Touring; with many extras.
 \$285—1913 CHALMERS Limousine; seven-passenger, in A 1 condition and fully equipped; excellent renting car.
 1914 FORD Touring; with a 1916 body; in excellent condition; has many extras.
 \$225—1914 OAKLAND Six Touring; seven-passenger; in good condition.
 Winter Top for a 1916 Dodge Roadster.
 Winter Top for a 1916 Hupmobile Roadster.
 Coupe Body for a Cadillac, sedan, limousine and delivery bodies.
LANGHAM MOTOR CAR CO.
 162 Columbus Ave.

Model 34 MARMON; 7-passenger, in the finest possible condition; one of the "easiest riding cars in the world;" can be bought at a sacrifice; owner must dispose of; call early for demonstration.
 1916 STUTZ Bulldog; 4-passenger, painted red, with red upholstery, very sporty, fast and powerful; this car should be seen to appreciate a real bargain; call for ride.
 1917 VELIE; 7-passenger; divided front seats; very roomy; run less than 5000 miles; cannot be told from new; cost \$1950; will sacrifice for almost half price; fully guaranteed.
 1917 CHANDLER; 7-passenger; practically new tires; motor in very good condition; needs coat of varnish; can be bought cheap; call for demonstration.
 1917 KING "8;" 7-passenger; run 4000 miles; very smooth and powerful; looks fine; fully guaranteed and will demonstrate anywhere.

COMING EVENTS

RACING CONTESTS.

Danbury, Conn., track race.....Oct. 6
 Uniontown, Pa., speedway race....Oct. 6
 Chicago, Ill., master drivers...Oct. 11-12-13
 Richmond, Va., track race.....Oct. 13
 Chicago, Ill., speedway race.....Oct. 13
 New York, speedway race.....Oct. 27
 Columbus, O., Dixie tour.....Oct. 24

SHOW CALENDER.

Buffalo, N. Y., closed car show..Oct. 1-6
 Boston, Mass., closed car show..Oct. 6-13

Cincinnati, O., dealers' show..Oct. 6-13
 Dallas, Tex., Automobile and Accessory Dealers' Association.....Oct. 13-28
 Denver, Col., automobile show..Nov. 12-18
 New York, national automobile show.....Jan. 5-12
 Montreal, Can., national motor show.....Jan. 19-26
 Chicago, Ill., national automobile show.....Jan. 26-Feb. 2
 Boston, Mass., Boston Automobile Dealers' Association show, Mechanics' building.....March 2-9

1917 CHALMERS; 6-30 Touring; very powerful; 3400 revolutions a minute motor; just the car for an economical family; cannot be told from new; call and be convinced.

1916 MAXWELL Roadster; run less than 4000 miles; in elegant condition; you can save about \$200 to \$300 on this car by seeing it early; call and we will demonstrate anywhere.

1916 BUICK "Big Six;" 7-passenger; in first class condition; now being revarnished; if you want power, speed and comfort combined, see this early; good tires and guaranteed thoroughly.

1913 FIAT; 5-passenger; slip covers and in perfect condition; looks like new; fully equipped and guaranteed; can be bought at your own price.

1914 CADILLAC; 7-passenger; Mr. Renting Man here's the car you want; in fine mechanical condition; cannot be better; newly painted and first class tires; call early and be convinced as to a good buy.
 1913 MAXWELL Special; 5-passenger; must be sold before Tuesday; make offer; whether for junk or pleasure driving; see this and make an offer.

1912 LYONS-KNIGHT Racer; bucket seats; looks good; will sell for practically junk price; call and make an offer.

METROPOLITAN USED CAR CO.
 16 Columbus Ave.

PROVIDENCE.

1913 CADILLAC Touring Car with starter and lights and extras at \$390.

1916 OLDSMOBILE "4" Touring Car; a car that has had the best of care by female owner; was \$850; price now \$690; \$350 cash; balance easy.

STUDEBAKER Touring Car; a bargain at \$450; this car is worth considerable more than we are asking.

STUDEBAKER Touring Car at \$500.
 COLE 6-passenger Touring Car; in fine order; a snap at \$590.

1916 BRISCOE Touring Car; new paint, good tires; just the car for salesmen; was \$475; now \$330.

We now have a DODGE Touring Car in fine condition; price low.

FORD Touring Cars; prices very low.
 Extra Snaps; prices cut from \$400 to \$500;
 BUICK Roadsters; five of these; \$250 and up.

MARION Touring Cars at sacrifice prices.
 CADILLAC Touring Car at \$250.

2 METZ Touring Cars. If you are looking for the most for your money see these at our prices; \$250 up.

STUTZ Runabout; electric starter and lights; slight repairs will make it as good as new; \$850.

SAXON Roadsters; \$150, \$250, \$325.
 Model 83 rebuilt 1916 OVERLAND Touring Car; a real family car that we guarantee until Jan. 1; \$500.

1915 KING Touring Car; 5-passenger; like new; a big bargain at \$590.
 R. C. H. Touring Car; in good order; our bargain price \$200.

SMITH FORM-A-TRUCK; run less than two months; a snap at our price.

PUGH BROS CO.
 53 Mathewson St.

1917 BUICK Touring; little 4-cylinder; run 2000 miles; a new car; in Thursday.

1916 COLE Touring; 8-cylinder, 7-passenger; motor very quiet; a beautiful riding car.

1916 OLDSMOBILE Touring; 8-cylinder; a light and roomy car; 33x4 tires.

1916 OLDSMOBILE Touring; 4-cylinder; a very light car, with plenty of power; 18 miles to a gallon.

1913 HUPMOBILE Runabout; self-starter and electric lights; 33x4 tires; \$350.

1915 REO Touring; a light touring car with a lot of power; overhauled and painted.

1916 FORD Touring; Crown fenders, rain vision windshield; in perfect shape.

1913 HUDSON Touring; model 37; self-starter and electric lights.

WILLIAM MULRY.
 98 Empire St.

FORD Touring; taken in trade for the Chevrolet; a good buy for a little money.
 BUICK Touring; has always had the best of care; a chance to get a good car for a little money.

1916 FORD Delivery; good car at a reasonable price.

FORD Touring Body; a bargain.
 FORD 1917 Runabout Body; used very little.

FORD Touring; has had very good care; looks good and runs well; a good family car; terms on all the above cars.

EDWARDS & LANPHEAR.
 17-19 Snow St.

At 773 Broad St.

WHITE small 4-cylinder Roadster; electric lights and starter; very fine condition; \$475.

1915 DODGE BROS. Touring, \$475.

1916 DODGE BROS. Touring, \$550.

MITCHELL Roadster; very fine condition; \$500.

1913 648 PIERCE-ARROW Limousine; Westinghouse shock absorbers; best of condition; \$1500.

1916 COLE, 7-passenger touring; wire wheels; exceptionally good condition; \$1100.

1917 OLDSMOBILE 8-cylinder Sedan; \$1450.

Also several others from \$100 to \$2000.

We will take your old car in exchange. Time payments if desired.

CADILLAC AUTO CO. OF R. I.

PLATE IX

BRICK GARAGE PLANNED FOR A LARGE HOUSE

Commodious Structure With Model Features in Its Door Equipments, Chauffeur's Quarters and General Conveniences

Designed by the Architectural Department of the Automobile Journal Publishing Co.

THE garage herewith shown is designed for brick construction and has been laid out with areas for two large cars and space between for a smaller car. The structure is ornate and of the generous dimension of 42 feet front, with a depth of 32 feet. It is planned on a scale to furnish the accommodations usually needed by the owner of a large house and as recommended for construction will prove an ornament to any estate.

For what are designated as the car spaces there is provided a granolithic floor of the best type, and each of these areas, adjacent to the sets of large double doors, is fitted for adequate drainage. The location of the drains and pitch of the floor, as seen on the accompanying drawing, shows one drain in the bottom of the pit, insuring a clean, workable place at all times, and the other at the floor level. Thus a separate washing floor is provided when the pit floor may be otherwise occupied.

In the construction of this building concrete is shown and advised for the foundations and footings. However, a good stone wall is extremely suitable if the wall is properly laid. If stone is used a good cement mortar should be supplied as the binder for tying the wall units together.

Several banks of windows are set in the frame as the means of providing good lighting and ventilation. In addition the window shown at the ridge in the roof may be hinged and opened at any time in order to vent the room below. Electric bulbs should be supplied to suit the taste of the owner and conditions of the premises, and ample illumination furnished for the various spaces and rooms shown.

The main doorways of this garage, eight feet by nine feet, are provided with the type of doors which swing outward and are equipped with Stanley wrought iron garage door hinges, consisting of sets of No. 1459 and 1456 hinges and No. 1052 bolt. These hinges, designed for heavy doors, are exceptionally strong. They are equipped with ball bearings fitted between the hinge joints. Powerful leverage strength is provided by the long leaf, which also prevents the door from sagging. Time and labor are saved in hanging doors on these hinges, as the jamb only

is mortised, the door put in place and the surface leaf applied to the face of the door with either carriage bolts, lag or wood screws. The No. 1459 hinge is 36 inches long, having a $2\frac{1}{4}$ inch offset and $4\frac{1}{2}$ inch throw and the pad four inches wide. The purpose of the No. 1456 hinge is to swing a garage door clear of its opening. The strap is made in two sizes, 24 inch and 10 inch, and the usual method of hanging a garage door with them is to put a 24-inch strap at the top and bottom of the door and a 10-inch strap in the centre. Unusually heavy doors are strapped in accordance with architects' recommendations.

Garages represent a fixed investment and their doors should be hung on efficient hinges, letting the first cost of hanging the garage doors be the only cost.

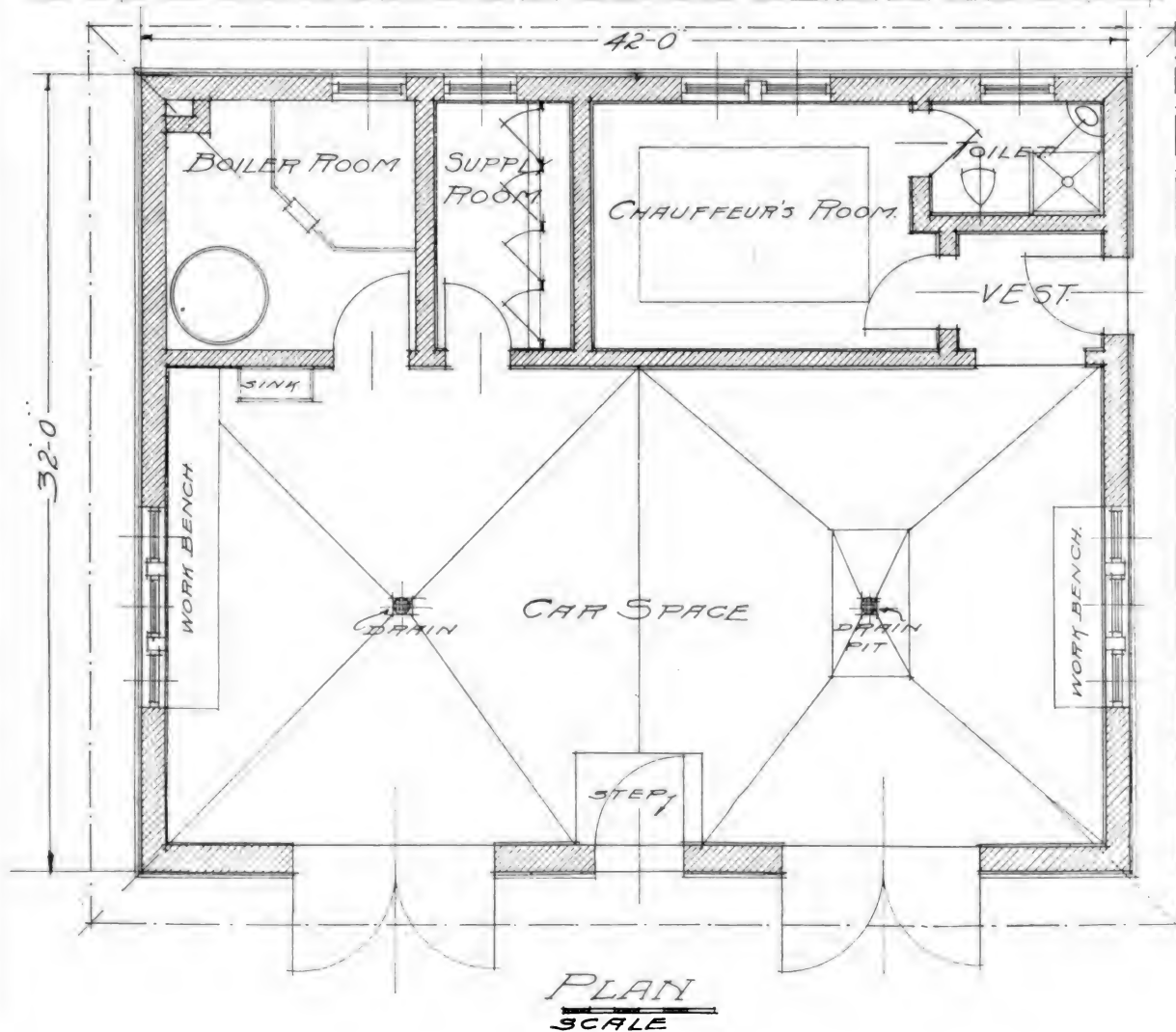
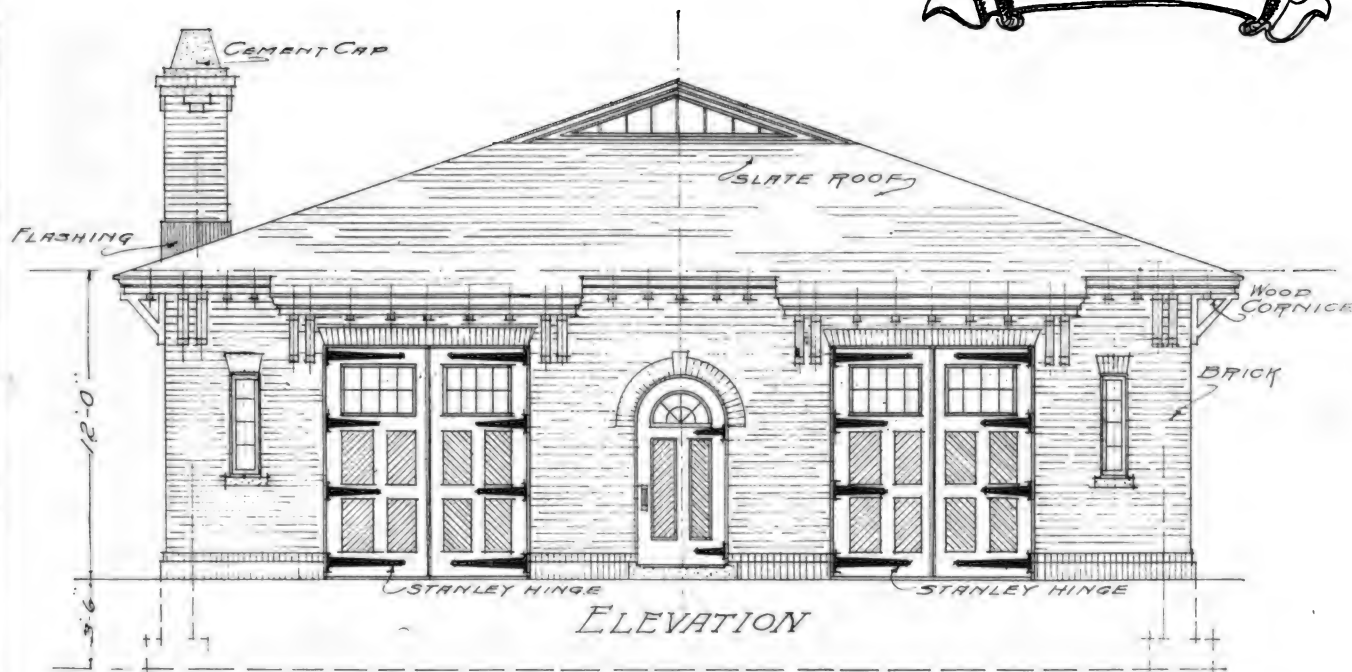
On this garage the roof construction is of wood, having as a finish a choice of slate or asbestos shingles. Either material has fine quality as fire resistant. The entire trim is of wood, including cornice, brackets, windows, trim and doors. White pine or cypress should be used as these materials stand well under weather conditions.

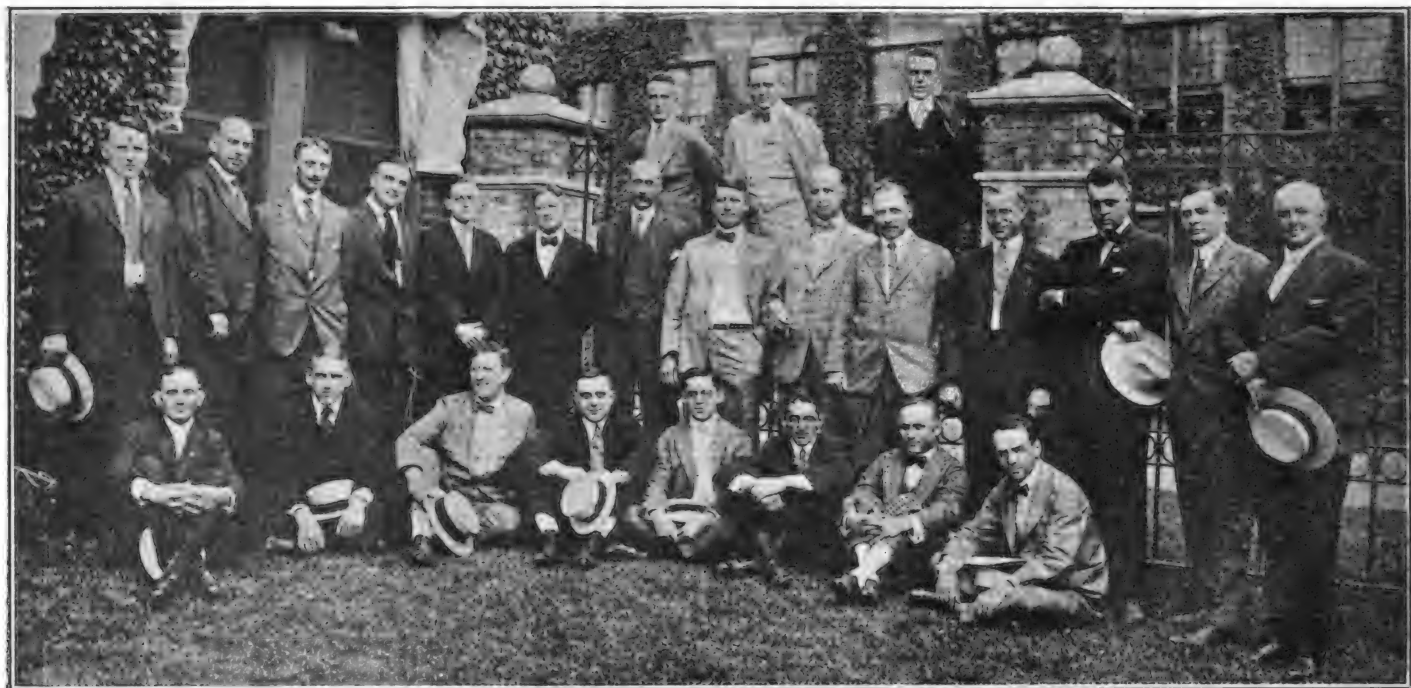
In conveniences, appointments, extra rooms and storage there are very generous provisions in this garage model. In the rear will be found a chauffeur's room, off which there is a lavatory and shower bath. The toilet room should be finished in tile, with a hard plaster finish for the upper walls and ceiling. A large supply room has been provided, having several cupboards for storage, a system which experience has shown to be far superior to having them around the sides of the building near the car spaces.

A boiler room of ample size has been planned, with coal storage in a corner directly opposite the furnace, making firing convenient. The supply of working space in the garage has been borne in mind by the provision of two large work benches, and a sink is likewise provided.

Entrance may be had from the side of the garage into a vestibule which opens into the chauffeur's quarters and also directly into the garage. Another entrance is provided in the front, between the two large doorways. The cost is approximated, complete, at about \$3000.

PLATE IX.





Group of Standard Woven Fabric Co. Sales and Branch Managers at the Convention Recently Held at Company's Plant, Walpole, Mass. Those in the Picture: Bottom Row, Left to Right, H. F. Marquardt, C. K. Everett, T. J. Daley, F. W. Dilger, C. O. Anthony, R. D. Northup, D. Hollingsworth, H. Tipper. Middle Row, Left to Right, E. O. Christiansen, M. D. Davies, T. Howard, J. C. Donnelly, H. E. Fannon, R. Everett, S. Bell, M. Voorhes, D. E. Bailey, F. J. Gleason, M. J. Cornelius, T. Lamb, W. H. Williams, C. W. Blackman. Top Row, Left to Right, P. Gardiner, F. V. McGraw, W. J. Mahoney.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

The Standard Woven Fabric Company salesmen from the entire country gathered in Walpole, Mass., recently at the factory for their annual sales conference and business discussion. The men went on a tour of inspection through the plant and were shown the various processes employed in the manufacture of Stanwal brake lining. At the sales meeting selling plans were discussed and announcements made regarding the advertising campaign for the coming year. President Stoughton Bell who presided at the sessions was host to the salesmen at his summer home where the men enjoyed a clam bake and various sports.

Arthur Asa Hill, editor of the Automobile Dealer and Repairer and the Blacksmith and Wheelwright, died at his home in New York City on Sept. 13. Mr. Hill was a native of Sandwich, Mass. He was one of the original members of the New York Press Club and formerly owned and edited the Haverhill (Mass.) Gazette and later the North Adams (Mass.) Evening Herald.

The H. J. Koehler Motors Corporation, Newark, N. J., has announced the appointment of the following agencies for the Koehler 1½-ton truck: Jos. Serivani, the Motor Shop, Wildwood, N. J.; Evatt & Wilson, 614 Louisiana St., Little Rock,

Ark.; Jas. L. Wall, Batavia, O.; H. E. Bailey, Lincoln Highway Garage, Wrightsville, Pa.

Willard S. French, formerly of the C. S. Von Poettgen Advertising Agency, has been appointed director of sales of the Monarch Governor Co., Detroit, Mich., manufacturers of the Monarch governor.

The Packard Motor Car Co. sales organizations have organized country wide sales contests participated in by the members of the various Packard branches and agencies. The truck salesmen and carriage salesmen will each hold separate contests and there will also be a interdepartmental contest in which the two branches will compete. Used car salesmen and the recent graduates from the Packard carriage sales school will also hold a contest and to carry out the general idea thoroughly the dealers in the two largest groups of Packard distributing points have formed competitions with in their own organizations.

The Westinghouse Electric & Mfg. Co. has transferred the New York Branch, located at 157 West 54th St., which has been handling the repair parts and service work of Westinghouse Automobile Equipment to the P. J. Durham Co., who will continue to operate in the same building until arrangements can be made to

consolidate all service work of the Durham Co. at 244 West 49th st.

The Bearings Service Company, service representatives of the Timken Roller Bearing Co., the Hyatt Roller Bearing Co. and the New Departure Manufacturing Co., all makers of bearings for automobiles, at its several branches over the country, maintains complete stocks of Timken, Hyatt and New Departure bearings so that the garage man may secure practically any bearing he needs at a single service station. Before the establishment of the Bearings Service Co., long delays were often caused by the fact that there were no central located sources of supplies where a repair or garageman could obtain needed bearings. He would have to send to one supply house or factory for one kind of bearings and to a different source for another.

The Ford Motor Company, Detroit, Mich., for the fiscal year ending July 31, 1917, shows total assets of \$158,834,779 and total liabilities of \$25,229,871, leaving net assets of \$133,604,907. The company's gross business for the year is estimated at \$350,000,000 as compared with \$206,867,347 in 1916 and a total of 785,432 cars were manufactured as compared with 539,921 for the fiscal year ending July 31, 1916.

The Emerson Motors Co., which is at present operating in a plant at Kingston, N. Y., is being reorganized as the Campbell Motor Car Co., taking the name of the president and general manager, T. A. Campbell. The new company will be capitalized for about \$2,700,000. The company will manufacture a new car to sell for \$750 which will have the same motor as is being used in the Emerson cars, a Salisbury axle and Muncie gear-set. About eighteen cars a week are being turned out by the present company which is said to have assets totaling \$600,000.

The Essex Motor Car Co., is a new concern organized by a number of officials of the Hudson Motor Car Company of Detroit to manufacture a lighter car than the Hudson which will sell at a considerably lower price. The Officers are: president, W. J. McAneeny, factory superintendent of the Hudson company; vice president, R. B. Jackson, secretary and treasurer of the Hudson company; treasurer, A. Barit, purchasing agent of the Hudson company. These officials and Roy D. Chapin, O. H. McCormack and F. O. Bezner comprise the directorate. Mr. Chapin is president of the Hudson Motor Car Company, Mr. McCormack sales manager and Mr. Bezner vice president.

E. V. Anderson has been appointed receiver for the Sun Motor Car Company, Elkhart, Ind. The receiver states that from appearances of conditions surrounding the concern's affairs the administration contemplates a sale of the assets and winding up of the business of the company.

The Abbott Corporation, Cleveland, O., is introducing a new car in its 1918 line, betterments and improvements being incorporated in both the body as well as chassis design. A unit power plant is used with Continental $3\frac{1}{2}$ x $5\frac{1}{4}$ engine, disc clutch and selective type gearset. The wheel base of the new chassis is 122 inches. There are three models, the seven-passenger touring car at \$1,595; four-passenger roadster at \$1,595 and a four-passenger coupe and five-passenger sedan each priced at \$2,150.

The Maxwell Motor Co., Detroit, has taken over the Chalmers Motor Company plant under the terms of the lease by which the latter will be operated by the former organization for a period of five years. Notice of the change which has been posted in the Chalmers plant states that Walter E. Flanders, president and General Manager of the Maxwell Company and other officers will have charge of operations in the plant and that an announcement will be made later regarding the names of the men who will be in direct supervision of the different departments. All the officers of the Chalmers company resigned following the execution of the lease and a number of New York lawyers who negotiated the lease were elected in their places. Hugh Chalmers, however, while retiring from the presidency, will remain as chairman of the Board of Directors.

The Grant Motor Car Corp., Cleveland,

O., is planning the erection of an extension to its plant, four stories in height and 875 x 60 feet. The cost will approximate \$750,000.

The Ross Automobile Co., Detroit, Mich., has been placed in the hands of a temporary receiver and it is expected that the creditors will receive their claims in full. H. D. W. Mackaye, formerly general manager of the company, has been appointed temporary receiver.

John H. Lemmon, formerly with the Watrous-Esty Advertising Co., the Macavoy Advertising Co. and more recently connected with the Nichols-Finn Advertising Co., has been appointed advertising manager of the Sterling Motor Truck Co., Milwaukee, Wis.

The Winton Co., Cleveland, O., has announced an increase in the price of the Winton Six model "33" five passenger touring car, which will become effective on October 15. This model which now sells for \$2,685 will be advanced to \$2,950 and proportionate advances will be made on the prices of other body types, both open and closed in this model. The company, however, will accept all orders booked before October 15 and for delivery prior to December 1st at the present prices. No change in the price of the Model "48" Winton which sells at \$3,500 has been announced but it is not unlikely that a raise will be made at an early date.

The American Brass Foundry Co., Milwaukee, Wis., has changed its name to The American Metal Parts Co. The change was made following the purchase of an interest in the business by S. A. Fulton, president of the Fulton Co., of Milwaukee, 726 National Avenue which handles the entire sales of American Bumpers and other products of the Metal Parts company.

The Doble-Detroit Steam Motors Company has leased the plant at Fourth and Porter Streets, Detroit, that was formerly occupied by the Bolles Iron Works. The joint offices of the company and the General Engineering Company, now at 808 Marquette Building, will be continued. It is expected that deliveries will commence about the first of the year and the manufacturing schedule calls for a production of 2,500 cars annually.

Arthur N. Goodfellow has been appointed western sales manager of the Nice Ball Bearing Co., Nicetown, Philadelphia, Pa. He will have headquarters in Detroit at 1248 Book Building. Mr. Goodfellow was formerly associated with the Standard Roller Bearing Co.

Hal T. Bouldon, sales director of the Selden Truck Sales Co., Rochester, N. Y., distributors of Selden trucks in the United States, has called the annual sales conference of the division sales managers, which will be held in Rochester during the week beginning Oct. 1.

W. C. Durant, head of the General Motors Corporation, in answer to some rumors recently current in the financial district, states that the company is not contemplating any financing nor any consolidation of companies. In explaining the present financial status of the company he stated that the company had not

sold any cars except for spot cash and that it had more than \$15,000,000 cash in banks plus \$1,000,000 Liberty bonds and nearly \$5,000,000 of sight drafts in connection with cars in process of delivery. From Aug. 1 to Sept. 12, 2349 Cadillac cars were sold, against 452 in the same period last year; 3740 Oldsmobiles, against 1074 last year; 16,039 Buicks, against 12,120 last year, and 829 trucks against 316 last year, making a total of 27,071 for the period against 16,963 in the same period last year.

The Kissel Motor Car Co., Hartford, Wis., has announced the appointment of the following new dealers for Kissel Cars and trucks: E. A. Roemer, Creighton, Neb.; Wakefield Motor Co., Wakefield, Neb.; S. E. Newell, New Philadelphia, O.; J. H. Colliflower, 130 Fourth street, S. W., Canton, O.; J. R. Bennett, Clio, S. C.; Hall-Hicks & Steele, Rigby, Ida.; Medford & White, Grace, Ida.; King Auto and Repair Co., Charleston, S. C.; L. Bennett & Co., Orangeburg, S. C.; Steubenville Hardware and Supply Co., Steubenville, O.; Sussex Garage, Sussex, Wis.; Crescent Auto Co., Peoria, Ill.; Buhl Auto Co., Buhl, Ida.; Heath Motor Co., 1610 Euclid avenue, Cleveland, O.; Bakersfield Motor Car Co., Bakersfield, Cal.; P. A. Simon, Mina, Nev.; A. D. Adkins, Thompson, Ga.; Frank L. Fries, Kittanning, Pa.; International Rubber Sales Co., Wheeling, Va.; L. H. Church, Rio Vista, Cal. T. S. & W. E. Jeanes, Sylvestor, Ga.

The Prest-O-Lite Co., Indianapolis, Ind., has appointed the following new service stations for Prest-O-Lite storage battery service: Corning Battery Co., Corning, Ia.; Westminster Garage, Venice, Cal.; Mills & Condiff, 357 West Eighth street, Riverside, Cal.; Reedy-Naddy Auto Supply Co., Fourth and Spring streets, Columbus, O.; Paul Henderson Garage Co., Morristown, Tenn.; Kelly's Garage, El Reno, Okla.; Browning Auto and Supply Co., Idaho Falls, Ida. W. L. Ramer, 330 Walnut street, Red Bluff, Cal.; O. L. Bowen, 144 W. Bridge street, Blackfoot, Ida.; Cockcrofts Garage, Corning, Cal.; The Nicholds Co., 424 Grand River avenue, Detroit, Mich.

William C. Little, western sales representative of the Bearings Company of America, of Lancaster, Pa., has moved his offices in Detroit to 1012 Ford building. His headquarters were formerly at 604 Ford building in that city.

J. A. Dieber has been appointed buyer and manager of the sporting goods and automobile accessories department of the G. Sommers & Co., St. Paul, Minn. He succeeds L. T. Ware.

The Westcott Motor Car Co., Springfield, O., for the year ending June 30, 1917, reports the largest business in its history and a preliminary report on the business for the first quarter of the current fiscal year shows sales nearly double the average quarterly business for the fiscal year just closed.

W. H. De Lancey has been appointed manager of the new branch of the Empire Rubber and Tire Co., recently opened in the Traders' building, 19th and Campbell streets, Kansas City, Mo.

DO YOU HEAR

the UTILITY KID signaling
you to go ahead and get

UTILITY VARNISH RENOVATOR



THIS is a NECESSITY not a luxury. Because if you are particular about the appearance of your automobile in WINTER, you'll need "UTILITY". It's no joke to clean your car in cold weather the "old way". You require a multitude of tools—sponge, hose, boots, etc. and you have a cold, unpleasant job. Why not

**Avoid that old-time dirty mess—
You can clean your car in evening dress**
with cheese cloth and a can of "UTILITY RENOVATOR."

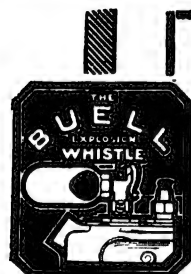
Remove the water spots from your car.
Cover up the blemishes caused by flying ice and sleet.
Dissolve and remove mud absolutely, without scratching the varnish.

DEALERS—Why not be prepared to give your customer that which he will need? Our special offer sent on request.

LIST PRICES

4 Ounce bottles 25c Quart cans \$1.00
12 Ounce bottles 50c Gallon cans \$3.00

POUGHKEEPSIE UTILITIES CORP.
46 Wampanoag Ave. POUGHKEEPSIE, NEW YORK



**NO COST TO
OPERATE**

ATTRACTS ATTENTION

Whenever Blown, Wherever Shown

The Buell Explosion Whistle is the first whistle to be adopted as standard equipment on any automobile. It has passed the rigid requirements of the Engineering Departments and is giving exceptional service under the most trying conditions.

The Buell is very simple and its installation is easy, it only being necessary to screw it in place of a priming cup. The 250 pound explosion pressure blows it powerfully, surely and without chance of carbon collecting and causing failure when most needed. It responds to the slightest touch and is exceptionally effective as a warning, owing to its pulsating blowing.

Ask your dealer to show you one
or write for circular describing
this interesting device.

BUELL CO.

1610 So. Michigan Ave.

CHICAGO

90,000

SPRINGS

90,000



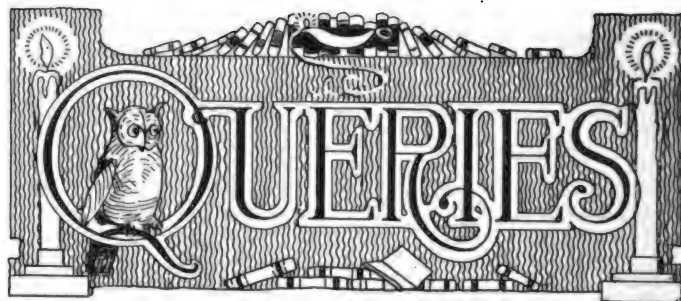
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT EXPERIENCE HAVE YOU HAD WITH KEROSENE CARBURETORS, MANIFOLDS, OR OTHER KEROSENE BURNING DEVICES FOR USE ON THE ENGINE AND WITH WHAT RESULTS?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of October. The contest is open to every one.

CARE OF THE ENGINE COOLING SYSTEM.

(R. L. Prindle, No. Abington, Mass.)

The gasoline engine is one form of heat engine; since the power developed is obtained almost directly from the heat produced by the combustion of gasoline and air within the explosion chamber.

It has been found that more than 33 per cent. of the engine power is dissipated through the cylinder walls and water jackets. This being the case, it can be seen easily that some means must be employed to dissipate part of the 2500 to 3500 degrees of heat generated by the explosion, or the engine would soon melt or become heated to a dangerous degree.

Two methods of cooling are employed in modern engines; air and water. By the first method the cylinders are fitted with radiating fins and exposed to the air so that the temperature is kept down to a safe operating limit.

By the second method the cylinders are kept cool by being surrounded with a bath of water, which in turn is cooled by the passage of air through a radiating device.

In both systems it is essential that the fan be kept at its highest efficiency. For this reason it should be inspected often and kept tight so that it will not slip. Oil on the belt often causes slippage and should be absorbed by liberal applications of French chalk at intervals. By this means the belt is kept flexible and efficient.

In the water cooled systems the pump is apt to get clogged with iron rust or sediment, particularly if the system is not cleaned at regular intervals. The stripping of a gear or the shearing of a key on the driving shaft may result in the inaction of the pump. For these reasons the pump should be given regular attention and care. At least once a year the stuffing boxes at the ends of the driving shafts

should be packed and tightened to prevent leakage.

The next important part of the water cooling system is the radiator, which frequently fills up with sediment or rust. This important part should receive as much consideration and care as any other part of the car. The radiator should be cleaned regularly so that it will function properly. If this is done it will go a long way toward the prevention of pump trouble and keeping the engine efficient.

Many of the more common radiator troubles can be avoided if proper attention is paid the water supply. The use of pure water or water that has been filtered through cheese cloth is to be recommended. If the cooling system is filled with rust or deposits the water jackets should be opened if possible and cleaned with a scraper.

In ordinary cases three remedies are possible. One method which is often recommended consists of putting about one-fourth of a pint of glycerine in the radiator and letting it remain there for a week or two, running the engine frequently. At the end of that time the water mixture should be removed, the radiator flushed with water and refilled.

Another remedy often used consists of dissolving about one-half a pound of washing soda in the cooling liquid, letting it remain in the system during the day, while the engine is being run frequently. Then draining it off and flushing out the system thoroughly. In the third remedy potash lye is used in the same manner as was the washing soda.

In both thermo-syphon and pump systems the flushing should be done while the engine is running; the stream from a hose turned into the filler cap while the system is being drained.

STORAGE BATTERY CONSTRUCTION.

(J. T., Attleboro, Mass.)

Will you please tell me what elements are used in an ordinary lead storage battery, what happens when it is charged and how to store it for the winter?

The lead type of storage battery is simple in construction yet it requires attention just as much as any part of the automobile. If it is properly attended to it will last for many years and cause little or no trouble; neglect it, however, and trouble begins to appear. Lights burn dim, the starter will not work and the ignition sometimes fails.

The lead type of storage battery is composed of a number of cells. Each cell in itself is a unit and furnishes about two volts when fully charged. The cells are packed in a wax or paraffine covered box, with the connections between them bolted or burned together.

Each cell consists of what is called an element, which is immersed in a mixture of chemically pure sulphuric acid and distilled water. The element and electrolyte is contained in a jar, which is covered and sealed so that it is water and air tight, with the exception of a small hole in the top, through which the electrolyte may be renewed and to allow for the escape of gas.

The element consists of a number of dark brown metallic plates made of lead peroxide, joined together at the top by what is termed a post strap, and another similar row of slate gray plates made of sponge lead, insulated from each other by thin corrugated wood or composition separators.

The dark brown plates are positive, while the slate gray are negative, and an element always consists of one more negative than positive plate. The capacity of the battery is dependent upon the number of plates and their areas.

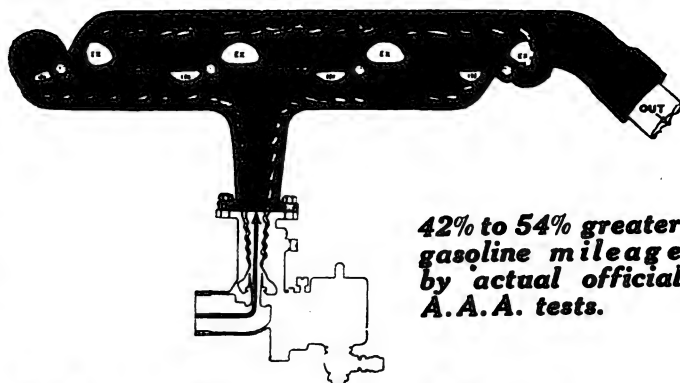
If simply lead peroxide and sponge lead were used the plates would soon buckle and the battery would be ruined, so the plates are reinforced by a lattice work of an alloy of lead and antimony, which serves not only to reinforce the plate, but to conduct the current and lower the internal resistance.

The element rests upon a number of ribs or bridges, which are made in the lower part of the jar, forming a space in which to hold the sediment thrown off from the plates.

This is the construction of a lead type storage battery when fully charged. The electrolyte, as has been said before, consists of sulphuric acid and water, having a density or specific gravity of from 1.285 to 1.300.

When an electric circuit is made a change takes place in

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the battery. The sulphuric acid begins to disintegrate and the sulphur or sulphate radicle, as it is called, unites with the plates, changing the plates to sulphides of lead and liberating oxygen from the lead peroxide plate.

This action continues until the plates have sulphated to such an extent that electrical action ceases. At this time much of the sulphate radical has been taken from the electrolyte, thereby causing its density to drop. By this means, then, the condition of the battery may be told by taking its specific gravity.

The reverse action occurs when outside current is forced into the battery, the sulphate radicle being driven back into the electrolyte, causing the specific gravity to rise, and the plates are changed back to lead peroxide and sponge lead as before.

It will be seen that a storage battery does not literally store the current, but produces current by chemical action. Theoretically, then, the life of the battery would be indefinite. At every charge the elements would be restored and the electrolyte put back to its original state. In practice, however, this is not so. At every charge small particles of the plates are thrown off and fall into the base of the cell, so that in time the plates are completely destroyed.

As this process of disintegration goes on the battery gradually loses capacity until either the plates are destroyed or short circuited by the precipitate reaching the bottom of the grids.

It would seem, then, that the life of a battery would depend upon the area and quality of the plates. This would be true if the actual operation of the battery followed the prescribed course. There are, however, many other factors which enter into the life of the battery.

Oversulphation is perhaps the greatest of battery ills and may arise from either of two causes. The ordinary sulphation of the battery, caused by normal discharge, effects the surface of the plates and extends slightly below the surface. As this sulphation increases from discharge, the sulphate extends deeper and deeper into the plate, and were the battery to be fully discharged the sulphation would be harmful. To reduce this extreme sulphation many hours of charging would be necessary. It is, therefore, best not to allow the battery to become completely discharged.

The second form of oversulphation is caused by exposure of the plates to the air by allowing the electrolyte to drop below the tops of the plates. When this occurs the sulphation is apt to travel downward and so reduce the capacity of the battery.

Too rapid a discharge of the battery, due to continued use of the starting motor, is another cause for short life. When the current is drawn in excess amounts the temperature of the battery rises rapidly, causing the plates to buckle and the water from the electrolyte to vaporize.

Ordinarily the battery requires but little care. If it is being used regularly it should be given attention about once a week. The specific gravity should be taken and distilled water added to bring the electrolyte to the proper level.

When the battery is to be put up for the winter it should be given a full charge and the electrolyte brought up to the correct level. It should then be kept in a cool place where the temperature does not drop below 32 degrees Fahrenheit and inspected monthly. Once every month it should be given a freshening charge and the electrolyte brought up to the proper level.

In adding water it is always best to add it before the charge is commenced or it will remain at the top of the electrolyte. The charging mixes the water and electrolyte.

As a general rule, where it is possible, the battery should be left at a battery station during the winter, since the cost is small, and one is assured that the battery will be kept in condition.

KNOCK IN FORD CAR.
(C. C. D., Philmont, N. Y.)

I have a 1913 Ford car which has developed a bad knock. The knock is more noticeable with the spark advanced, when ascending a grade, or at speeds of from 30 to 35 miles per hour. It accelerates all right, but when it gets up to speed it

begins to knock. I have had the crankshaft and connecting rods examined and they are tight. The wrist pins have been bushed recently. Do you think that the knock is in the camshaft or timing gears?

From what you write we doubt if the knock is due to camshaft or timing gear trouble, though it is such an easy matter to determine this that it would be advisable to try the following experiment:

Remove the timing box cover and firmly grasp the end of the shaft which carries the roller contact. By working this up and down you can locate any play should there be any in the camshaft. By twisting it back and forth you can locate any back lash or lost motion in the timing gears.

It would be a good plan to verify the valve timing by turning the crank until one of the pistons is at the top of its exhaust stroke, then turning it down $1/16$ inch. At this point the intake valve should begin to open. When the valves are set correctly the exhaust will close at top centre and the intake will close $9/16$ after bottom centre.

After the engine has warmed up thoroughly measure the distance between the tappets and valve stem. This distance should be about $1/64$ of an inch.

If the knock is not due to carbon deposits in the cylinders you will probably find that the knock is due to flywheel or gearset trouble. A knock in the transmission is often of such volume as to seem to arise from the engine.

The frequent cause of such a severe knock as you mention is a loose flywheel. The Ford flywheel is mounted upon two dowel pins and held by a number of bolts. The strain of the transmission frequently causes the flywheel to work loose and result in a knock when running at high speeds or under a load.

A worn universal joint or a joint that is loose upon either the propeller or drive shaft will cause a knock when running at high speeds. There have been cases where a knock of this type seemed to come from the front of the engine.

LOSS OF COMPRESSION.

(R. J. M., Philadelphia, Pa.)

The engine of my Ford 1914 car lacks compression and I find that I can spin it with comparatively little effort. It will run fairly smooth on the level, but lacks power on the hills. Can you tell me how to increase the compression?

The loss of compression may be due to trouble in the cylinders, pistons, valves or spark plugs, and it will be necessary for you to locate the leakage before you can remedy it.

With the engine running at normal speed, with an oil can squirt a few drops of oil upon the spark plugs at the joints. Should bubbles form it will indicate gas leakage and the joints should be made tight. If the plugs are at fault where the porcelain or mica retaining nut is located, the nut should be removed, the porcelain or mica taken out and the copper-astbestos gaskets replaced with new. The nut should then be put back and screwed down tightly.

If the leakage occurs where the plug is screwed into the cylinder the plug should be removed and the threads covered with a paste made of graphite and oil. Care should be observed in returning the plugs to turn them down tightly.

The next point for examination is the valves. If they have not been ground recently they should be ground into place very carefully. The strength of the valve springs should be noted and if they can be replaced without the use of a valve spring lifter they are too weak and should be replaced with new.

The clearance between the valve stems and tappets should be adjusted so that the distance is about the thickness of a business card. This adjustment should be made after the engine is heated.

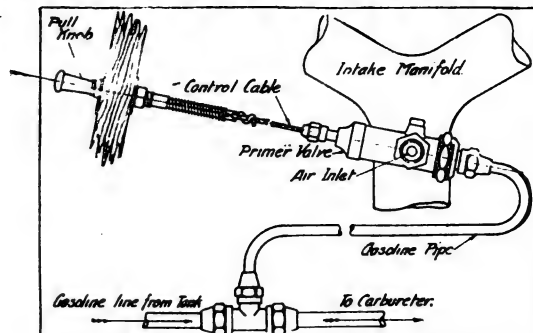
While the cylinder head is off the engine, make a careful examination of the cylinder walls. Dirt or grit sometimes works into the cylinders and the cylinder walls become scored or scratched, allowing gas leakage past the pistons. Ordinary scratches may be repaired by the following method:

With the engine running at normal speed, slowly pour about one teaspoonful of Dixon's flake graphite into the car-

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buretor air intake. Repeat this after about two minutes and allow the engine to run for about 10 minutes. Then remove all the spark plugs and clean them with kerosene. The graphite will form a surface over the scratches and increase the compression noticeably. The surplus graphite will be blown out through the muffler.

If the cylinder walls are badly scored the cylinders may be ground or rebored and many repair shops make a specialty of this work. Under certain conditions the cylinders may have worn out of round, they should be measured carefully and if they are not absolutely round they may be rebored or re-ground.

Lack of compression is sometimes due to the wearing of the piston rings. After a time the piston rings, which press against the cylinder walls, lose their springiness and the gas leaks past them. The installation of a set of leak proof rings is the best remedy, though a satisfactory repair may be made by fitting a full set of new bevel cut rings.

It is essential that the rings fit all points and they should be scraped and fitted in much the same manner that babbitt bearings are fitted.

The first step in fitting rings is to see that they conform in width with the piston grooves. To test this measurement the groove should be cleaned carefully and the ring rolled around in the groove. It should fit at all points, but not bind. The best practice is to fit each ring individually and put it into place, beginning with the middle, then the lower, then the upper.

After the ring has been fitted to the piston groove the beveled ends should be filed until the ring will just slip into the cylinder. Great care is necessary to keep the beveled ends flat and even. The inside of the piston is next coated with Prussian blue and the ring slipped into the cylinder. Upon removal the high spots will be indicated by a blue coating and these should be scraped off with a fine piece of emery cloth. If care is exercised the ring may be fitted until all parts of the outside contact with the cylinder walls.

When this is done the beveled ends should be filed until there is a clearance between them of about .006 of an inch (for a Ford car), when the ring is in the cylinder. The ring is then finished and may be put into place.

All of the rings should be fitted in this manner and placed upon the pistons, with the bevel cuts spaced upon opposite sides of the piston. Before putting the pistons into the cylinders they should be coated liberally with lubricating oil.

KNOCK IN BUICK 17 CAR.

(J. A., Orange, N. J.)

I have a model 17 Buick car which does not seem to be timed correctly. It is equipped with a Bosch D. U. 4 magneto and I would like to know the proper setting for it. At present the machine is set to fire at top dead centre, and with the spark fully retarded the engine knocks at about 20 miles an hour. With the spark advanced the knock is still in evidence. Do you think the knock is due to incorrect timing?

We doubt very much if the knock in the Buick engine is caused by faulty timing. The magneto should be set so that the breaker points will break at a piston position of about 1/16 inch after top centre on the firing stroke with lever set at full retard. As a general rule the spark may be advanced with the engine running at normal speed to take place from 1/2 to 3/4 inch before top centre, without causing a knock.

You say that with the spark set at full retard it takes place at top centre. This setting should be satisfactory unless it causes a kick back in cranking, and we would not advise you to alter it if the action is all right for starting.

The knock may be due to many other reasons, probably from excess carbon and preignition. We would advise you to inspect the cylinder and see if there is carbon deposited on the piston heads. There are a number of carbon removers on the market made by reliable concerns and if excess carbon is noticed you should try one of these.

The writer frequently has tried the following remedy and found it efficient for ordinary deposits: At the end of the day, when the engine is heated thoroughly, turn the piston in one of the cylinders to the top of its stroke (firing) and re-

move one of the spark plugs. Pour in about two tablespoonfuls of kerosene oil and replace the plug, letting it stand all night. Treat the other cylinder, one a day, until all have been treated. As a general rule the carbon will be blown through the exhaust the next morning.

If the knock is not caused by excess carbon it may be due to a loose bearing. In this case the bearing should be repaired as soon as possible or the engine may be damaged. Remove the oil base from the engine and examine all of the connecting rod and main bearings.

DELCO SYSTEM TROUBLES.

(J. B., Bridgeport, Conn.)

Will you please tell me how to test the coil and condenser of a Delco system, installed on a Cadillac 1914 car?

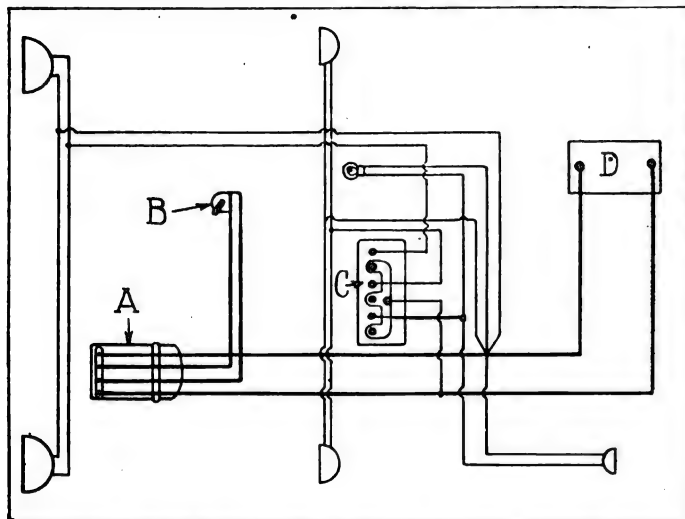
How are the straps and plates burned together in a storage battery?

Can I use the old sealing compound for resealing the battery and how can I soften it so that it can be used?

The cut out of the electrical system (Delco) sticks so that when the engine stops I have to open the contacts by hand or the current runs back to the generator. What is the trouble and how can I remedy it?

Will you please give me a wiring diagram of a Northeast 12 volt system?

The Delco coil is of the non-vibrating type and does not



Northeast Standard Wiring Model E, 12 Volt. Copied from American Bureau of Engineering Wiring Diagrams. A, Motor Generator; B, Starting Switch; C, Light Switch; D, Battery.

contain a condenser, the condenser being located upon the distributor unit. With the system in the car it may be tested as follows:

With the ignition switch in the "off" position turn the engine over with the hand crank until the points in the breaker box are together. Remove the secondary or centre wire from the distributor and hold it about 1/16 of an inch from the engine block. Then press the breaker points apart with the finger and have an assistant throw the ignition switch to the "On" position. Let the breaker points come together and separate them quickly. When this is done a spark should pass between the secondary wire and the engine block.

If the system has been removed from the car, place the coil upon a table and pass a heavy wire (iron or copper) across the end about 1/16 of an inch from both primary terminals and connect it with the secondary terminal. Connect one of primary terminals with a six-volt (three cell) storage battery. Connect the other primary terminal with one of the condenser terminals. Connect a wire with the other terminal of the storage battery and snap it across the remaining condenser terminal. If a spark is formed, indicating a passage of current, it is an indication that the condenser is short circuited or ruptured and needs replacing. If no spark

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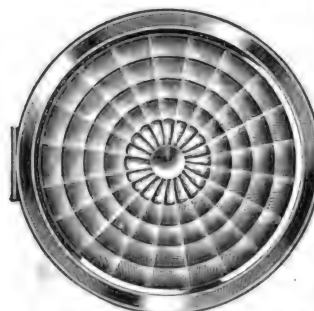
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is formed make a permanent connection between the battery and condenser.

With each of the condenser terminals connect a length of insulated wire and with one in each hand, snap them together and apart rapidly. A series of sparks should pass between the primary terminals and secondary wire of the coil. (See sketch enclosed for this wiring diagram.)

The lead straps, as well as the pillar posts, are burned on to the battery by a special method and requires special equipment much the same as that of welding. Lead burning is really fusing, or the melting together of the lead parts, and requires a great deal of experience. It is work that cannot be done satisfactorily without proper equipment.

The old sealing compound that was taken out of the battery may be used for resealing. To make it workable you can soften it with a warm putty knife. Be careful not to get it too hot, however.

The trouble with the cut-out is due to one of two causes, short circuit in the wiring, or improper adjustment. In either case we would advise you to have it inspected by an expert in this particular line, since a wrong adjustment will result in damage to either the battery or generator or both.

To correct the adjustment requires a series of tests and experiments. The spring tension should be strong enough to pull the contacts open when the discharge current from the battery reaches a point between 0 and 1 amperes, keeping them apart until the generated current is between 6½ and 7½ volts.

If you cannot secure the services of an electrical repair man and decide to make the adjustment yourself, you may proceed as follows: Increase the spring tension until the points do not contact while the engine is still, and until they are separated as soon as the engine is stopped.

While the engine is running at a speed equivalent to about 15 miles per hour car speed the contacts should be closed and a voltage reading with a volt-meter across the terminals should be between 6½ and 7½ volts. If it requires more than this current to close the contacts it is an indication that the spring tension is too tight and should be decreased.

Watch the ammeter on the dash which indicates "charge" and "discharge," stop the engine. The indicator should not drop back more than a small fraction beyond the zero mark, if it does, it is an indication that the spring tension is too weak and should be increased.

Should it be impossible to get a proper adjustment indications are that trouble exists either in the wiring or in the units.

The standard wiring of the North East model E system is reproduced herewith. Taken from the Ambu diagrams.

ADJUSTMENT OF THE STUDEBAKER.

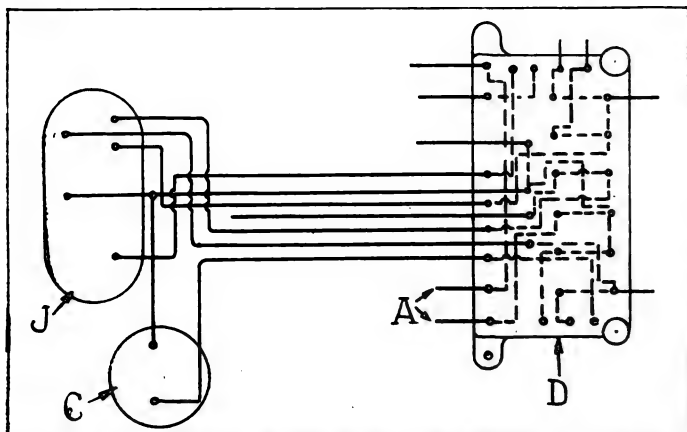
(Continued from Page 19.)

The differential is held together by eight studs and nuts. Remove the nuts and the differential case may be taken apart, exposing the differential gears and pinions. A careful examination of all of the gears and mountings should be made. If the pinions show signs of wear or do not fit the spider they should be renewed or a new spider substituted.

In putting the differential back into place it is essential that it be set properly in relation to the pinion gear. When the differential is in place the master gear should be set hard against the pinion and the bearing clamping bolts tightened. The adjusting nut, which is located on the outer end of the left bearing, should be turned so as to allow the master gear to clear the pinion gear about 1/32 of an inch. The adjusting nut on the right side should then be tightened until there is practically no play in the differential. The engine should then be started and, with both rear wheels clear of the ground, the high speed thrown in. The differential should run with little or no noise and adjustment should be made with the adjusting nuts until the gears are meshed to the correct depth. Before altering the adjustment or moving the nuts the engine should be stopped.

The steering gear is of the worm and wheel type. To disassemble it, first remove the four screws holding the worm wheel cover in place and remove this cover. After the steering ball arm has been unclamped and removed the worm wheel may be drawn from the housing.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Junction Box Diagram: A, Wires to Horn Button; C, Current Indicator; D, Junction Block; J, Lighting Switch.

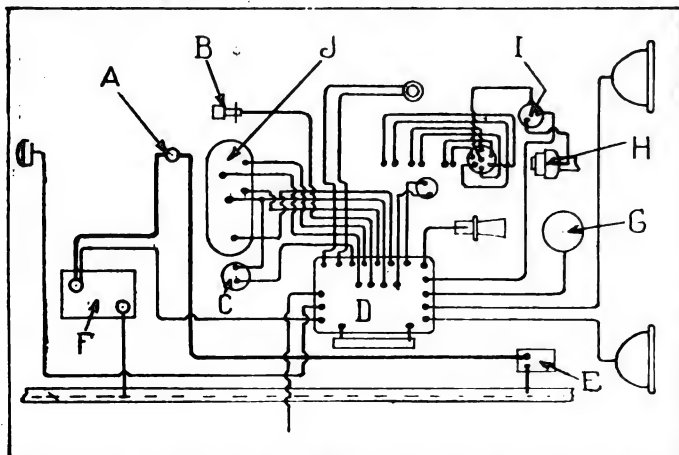
At the top of the steering gear case is a clamping bolt. This bolt should be loosened and the worm adjusting nut removed, thus allowing the worm and bearings to be withdrawn and the steering gear disassembled.

Timing and Adjustments.

As a general rule the timing gears are marked so that they may be set correctly. If they are not marked they may be set as follows: Turn the crankshaft with the hand crank until the flywheel marking UP-D-C-I is beneath the arrow. Then turn it forward five degrees. Next turn the camshaft counter clockwise until the intake valve in No. 1 cylinder is just opening. Then drive on the timing gear and mesh the gears. This setting can be checked by marks upon the flywheel, which indicate the opening and closing of all of the valves.

To set the spark the spark control lever should be set to extreme advanced position and the piston in No. 1 cylinder brought to the beginning of the compression stroke. The beginning of the compression stroke may be detected by holding the thumb over the open petcock until compression is felt. The upper dead centre position is indicated by the mark UP-D-C-I on the flywheel coming under the pointer at the top of the flywheel. Turn the crank until this mark has four inches to travel (for the four-cylinder engine) or 5½ inches (for the six).

Remove the distributor cover without disconnecting the wires, lift off the distributing segment holder and loosen the nut which holds the cam on the tapered shaft. After the cam has been pried from its seat turn it in a counter clockwise direction until it reaches a position such that when all parts are replaced the edge of the distributing segment will come directly under No. 1 distributor terminal. Then continue to turn the cam until the breaker points start to separate. Tighten the lock nut so as to hold the cam in this position and replace the distributing segment and cover. Check over the timing by removing the centre wire from the dis-



Wiring Diagram: A, Starting Switch; B, Speedometer Lamp; C, Current Indicator; D, Junction Block; E, Starter; F, Battery; G, Generator; H, Distributor; I, Coil; J, Lighting Switch.

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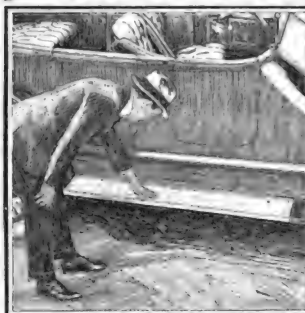
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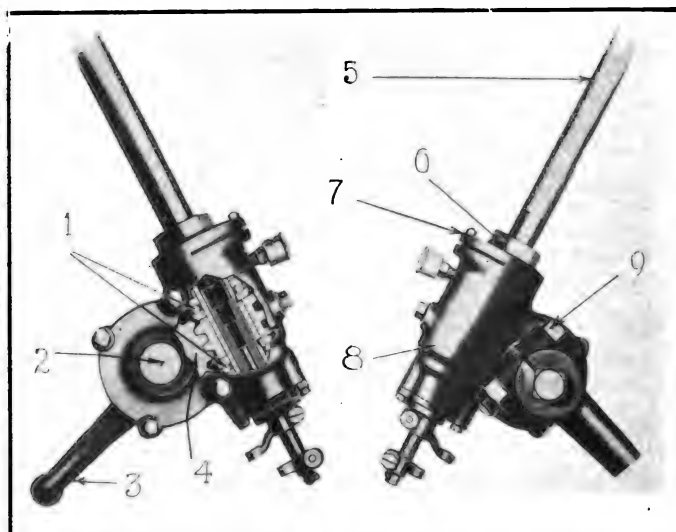
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tributor cover and holding it about $\frac{1}{8}$ inch from the engine block. A spark should be formed when the upper dead centre mark has the distances to travel as given above.

Adjustment of the Carburetor.

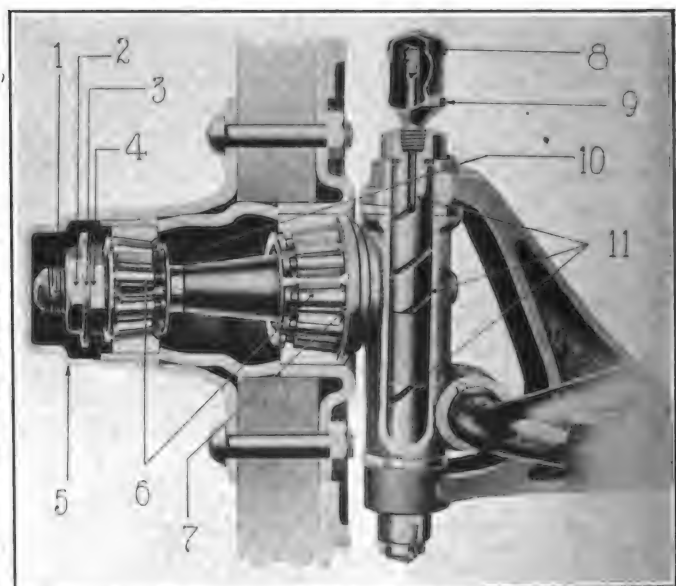
The carburetor adjustment is as follows:

Retard both the spark and throttle levers and turn the auxiliary air valve (the large adjusting nut) to the right as far down as possible; then turn it back, or to the left, $1\frac{1}{2}$ turns.

Now turn the high speed adjustment, which is located directly beneath the auxiliary air valve to the right, or as far up as it will go. With the adjustments in this position start the engine.

Next turn the auxiliary air adjustment either to the right or to the left (usually toward the left), until the engine fires upon all cylinders. This finishes the low throttle adjustment.

With the spark retarded, accelerate the engine and note whether it back fires. If it does not turn the high speed adjustment to the left or down by half turns until the engine does back fire upon quick acceleration. Then turn it to the right or up, slowly, until the engine accelerates smoothly without backfiring.



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A detailed black and white illustration of a large, ancient oak tree with a thick trunk and a wide, leafy canopy. At the base of the tree, a group of children are playing in a grassy field. Some are running, some are jumping, and one is sitting on the ground. In the background, there are more trees and a clear sky. The entire scene is framed by a thin black border.

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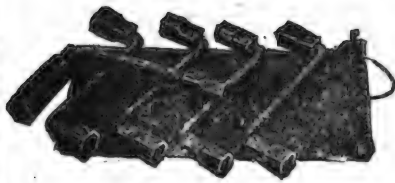
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VOL. LXIV

OCTOBER 10, 1917.



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*The Power and the Luxury of the Eight and the Twelve!
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MOST spectacular achievement is accredited to the new Jackson—the Eight with the Valve-in-Head. It literally embodies all cars in one. Now, no one needs to hesitate in choosing between the Four, the Six, the Eight or the Twelve.

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This gives to this new type Eight unbelievable results. It increases Jackson power one-fifth. No other motor of equal weight or same piston displacement gives, or claims to give, as much power.

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hands of owners is not only astonishing for the Eight but would do credit to most Fours and Sixes.

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The old type Eight's oiling problem is solved in this new car. The foot throttle regulates the oil supply automatically according to the engine's speed whether it is racing or idling.

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VOL. LXIV.

OCT. 10, 1917.

NO. 5

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Treasurer . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

Published the 10th and
25th of each month by the.

AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WINTER equipment for the motor car is an annually recurring question that confronts the motorist at this season. With every passing year, unless it be in the more rigorous climates of the northern tier, the number of car owners who lay up their cars for the winter season becomes less and less, for many reasons. Street cars and other public conveyances subject one to many inconveniences, delays and undesirable associations. Since the motor car is the standard private conveyance of this era, his own car must necessarily be the medium of the comings and goings of nearly every one who stirs away from home and fireside at all. As it is the custom of the publisher annually to collect complete data on accessories and equipment for winter motoring, the latest and best information is always to be found in the Automobile Journal Winter Equipment article. This article is now in preparation for a forthcoming issue of this magazine.

THERE has been unusual agitation this fall over the matter of lamps, owing to the widespread adoption of restrictive legislation regulating automobile headlights. "Lighting the Road" is the driver's greatest desire. The coming of long nights, the increased use of the motor after nightfall, due to war conditions and the spread of the all-year usage idea, makes this topic a leading one with all motorists. In this issue the light laws of all the states are compiled in brief and succinct form, illustrated with art diagrams and diagrammatic sketches showing the safety limits for motorists everywhere.

NEXT issue in the Garage series there will be a design of a two-car garage, with a rear section equipped as a machine shop, the home mechanic's garage.

THE Automobile Journal maintains that set prices on used cars, rated according to the make and model, are a detriment to the trade, a handicap to the manufacturer and an injury to car owners. It maintains that the service worth of a machine is the only safe criterion by which its value may be rightly judged and that the used car business, by insistent, progressive steps, must be established as a real business in order to arrive at the ultimate, proper solution of what is commonly termed the Used Car Problem. Efforts to establish a flat, off-hand price by any person, body or publication show a persistent disregard of the best interests of every element in motordom and merit nothing but disapproval and prompt discontinuance. The best conservation and constructive policies demand the handling of used cars on their distinctive merits, with methods that meet the approval of dealer and owner. More quotations from the used car market and other articles proving this appear in this issue and there are more to follow.

THE National Automobile Association news in this number will be found on pages 23-26. The bulletins are a helpful service to all motorists. Motorists who join the association receive the benefit of personal, legal and touring advice, in addition to many other benefits. Application blanks and full information obtainable at the address given in the heading on page 23.

WAR'S duties are upon the motorist everywhere. There are Liberty Bonds to buy, gasoline to save and a war tax to pay. Illuminating treatments of these vital questions are to be found in every issue of this magazine, and particular attention is called in this number to the able statement of the gasoline situation by that eminent authority, A. C. Bedford.

THE Automobile Journal

VOL. XLIV.

OCTOBER 10, 1917.

NO. 5.

LIGHT THE ROAD--Let the Heavens Illumine Themselves

**Facts for Motorists on Headlights and the Constructive Movement
to Free the Highways of Too Much Glare—Together With a
Digest Showing the Headlight Laws of All the States in the Union**

H EADLIGHT legislation has been passed in practically all the states of the Union during the past year. Some of these new laws have gone into effect recently and others will go into effect Jan. 1 next. Unlike many motor statutes which were framed and put into effect from angles of prejudice, these new regulations are welcomed by the motorists themselves, as they are the outgrowth of conditions that needed to be remedied.

Almost any operator of a car will freely testify to the discomfiture and inconvenience experienced by the use of the old fashioned powerful headlights which blind the vision of the driver and make it very dangerous to proceed at all while in the scope of the glare. If the operator is not familiar with the highway over which he is traveling the blinding glare of oncoming headlights practically compels him to take his life in his hands if he continues to proceed, as he cannot determine where the edge of the road lies or whether he may be running down some pedestrian, obscured from his vision in the darkness of the shadow outside the lights.

These new laws that have been passed regulating the use of lights coincide pretty generally as to their intent, although some are apparently unsatisfactory and will undoubtedly be revamped later when these states recognize the superior statutes adopted by the majority of states. On the whole however the action has met with the approbation of the mo-

torists compliance with it does not entail any great expense, as many manufacturers have arisen to the occasion with a product that meets the requirements of practically all the laws. The motorists also are glad that they are to experience permanent relief from the very dangerous conditions that sur-

rounded driving at night when reckless drivers sped about behind the dazzling light of a concentrated beam from a 12 to 40 candle power lamp oblivious to the interests of others.

With the idea of remedying these conditions, the problem to be solved was that of so regulating the rays of light that they would not reach the eye of another motorist, yet would retain sufficient brilliancy and penetration so as to give the necessary light for safe operation of the car under all conditions. It was therefore generally agreed after many tests had been made that the lights should be so focussed

that they would not be direct at a point 42 inches above the ground when the car is standing on a level road. The laws of the different states quite generally agree on this point, but prescribe varying regulatory conditions as to other points, including those of illumination, visibility, candle power, etc.

After examining the various laws it seems apparent that the motorist can comply with the intent of the law in practically every state by observing the extreme provisions, which would include the use of headlights that are so constructed, treated or equipped to prevent the beam of light rising more



No One Upholds a Continuance of One Motorist Blinding Another Approaching from the Opposite Direction.

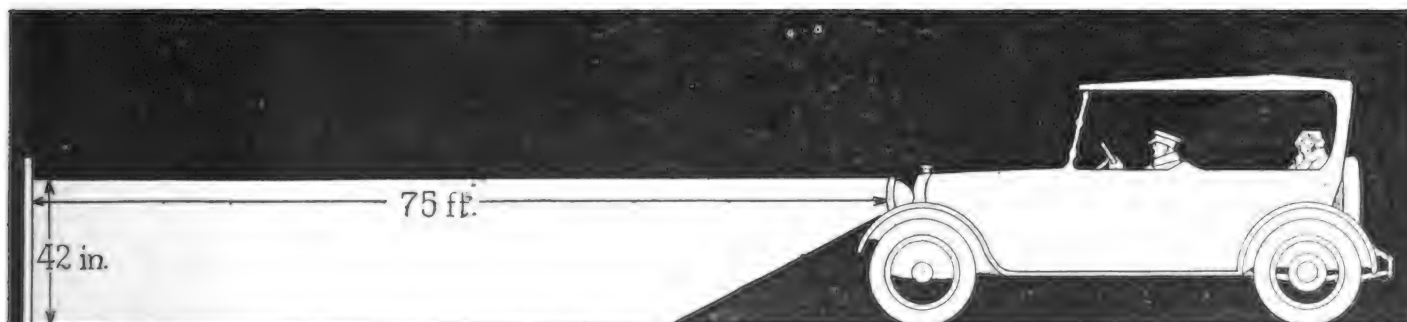


Diagram Showing a Light Focus, Meeting Requirements of Most Every State, on the Height of Beam of Motor Car Lamps at a Fixed Distance.

Feet Should Be Observed.

than 42 inches above the road at a point 75 feet ahead of the car, yet not so dimming the light but what it will be sufficient to make the roadway clearly visible 500 feet ahead and to provide sufficient illumination to reveal objects clearly at a distance of 250 feet ahead of the car and 10 feet to each side of the road at a point 10 feet ahead of the car; headlights should not exceed 21 candle power each and spot lights of over four candle power should be equipped with some dimming device or means of deflecting the rays.

Of course the object of law making to regulate the operation of automobiles on public highways is intended to work for the benefit of all, but in reality it compels the observance of ordinary precautions that are dictated by common sense. Persons who fail to recognize these precautions make it necessary to enact such statutes.

There are no operators of motor vehicles, of experience, who have not at some time or other been brought face to face with the great hazard entailed by the use of the powerful headlights and their blinding dazzle. When approaching a sharp curve along a highway with steep and unprotected declivity on the right side, one almost becomes terror stricken when his further progress is suddenly checked by the blinding flash ahead of two great headlights oncoming. It is absolutely impossible to guide the car with any accuracy under such a situation, as the edge of the road and, in fact, everything is obscured by the blinding light and in case the driver is traveling at a speed where it is impossible to check the car in a very short distance, his chances of going over the embankment are too large for comfort.

Every driver also knows that he has met many cars, the drivers of which observe every precaution with their lights to avoid danger, long before any states had even talked of the necessity of legislation to regulate, but there still remained a large enough number of drivers who persist in making driving conditions at night as dangerous as possible.

When the new statutes are generally observed the operators of cars will find that they are not only protected against many accidents that might be accounted for by their own acts as well as those of other cars.

Desire for Federal or Uniform Law.

Until the time comes when there shall be a federal, or at least a uniform, law for driving, speeding and lighting in every state in the Union, confusion continues for any motorist who crosses a state line. Aside from this purely political aspect of motoring, however, the ordinary law of the road, or what corresponds to the common law, is made and remade all the time. Common practises abound among motorists and so do uncommon practises. The latter may be expected to require even more attention than ordinary measures which merely involve obedience to the existing statutes.

While in general the laws of the states provide for at least two lights, in practise it is found to be a mistake that the law does not specifically state that these shall be two lights of equal size and candle power. Often motorists will drive their cars along the highway showing one large light and one small light. This deceives others, as one is apt to think this is a motorcycle with a side car. Then, when it is

too late, and owing to the deception, sufficient clearance was not allowed for passing, and an accident occurs, it is found that it was an automobile, requiring more space than a motorcycle.

Another bad practise, similar in nature and bad on similar grounds, is the lighting of one headlight only. It is due to the safety of all for motorists to take an urgent hand in helping to eliminate this practise. The object may be to save current and make the other lamp burn more brightly. It is none the less a very dangerous practise and most dangerous to other users of the highway. Having the left lamp lighted no doubt makes it better for the driver of the car, but the one approaching is placed at a disadvantage.

Occasionally a driver finds himself with a burned out lamp or a short circuit, but there is no excuse for this, as every one should have extra bulbs or fuses on hand.

Wherever a state has a law relative to the carrying of lights on horse drawn vehicles, this statute should also be rigidly enforced, as the light is often so placed that it is impossible to see it until too late to avoid an accident.

The situation which arises in the attempted enforcement of anti-glare headlight laws in many instances has brought just another bane into the life of the motorist. The majority of the motorists are anxious and willing to comply with the law if they know how to do so. When police and traffic officers are in a quandary as to just how to enforce that law, the menace of glare headlights continues to endanger life on the highways. Hundreds of thousands of dollars are ready to be spent by motorists in ridding themselves and the highways of this evil. They do not want to go on buying device after device, many of which are known as failing to relieve the glare of the lights and still necessitate dimming. Out of all the agitation, however, arises the fine spirit of the motorist to enter a campaign of education which will solve the disputed matters once and for all. The situation that has arisen is making great strides in the direction of assuring to all who use the highways better conditions for traveling, more freedom, safety and convenience.

That the motorist might get a digest of the various laws that would be readily understood the National Chamber of Commerce has compiled a summary of the laws of all the states in brief form. This is presented in the table on page 10.

Functions of the Spot Light.

The spot light has been found one of the most valuable adjuncts of motoring, especially for the tourist who drives into strange country where he is unfamiliar with the road conditions, grades and danger points. A few motorists have abused the use of the lights so that they quickly came to the attention of the legal authorities for regulation.

In mountainous country and in other sections where the roads wind along the sides of hills and cliffs with sharp declivities at the side, the spot light can be directed to reveal dangerous points to the motorist which otherwise would not be visible, as the headlights on the car always illuminate in

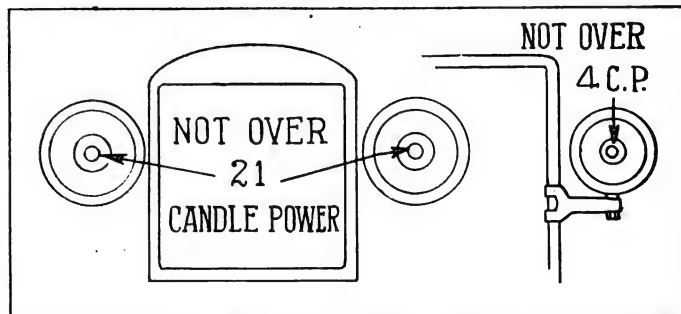


Diagram Showing Maximum Candle Power Set by Certain State Regulations for Car Lights.

the direction the car is proceeding and when taking a curve do not reveal the condition of the road ahead or any obstacles that might be present there. In this situation the spot light can be directed at an angle so that the driver can become acquainted with the contour of the land at the curve before he turns his front wheels.

The spot light also saves much manouevring of the car where the motorist needs a light to look at numbers on houses, road signs or to examine bridges, and in case of

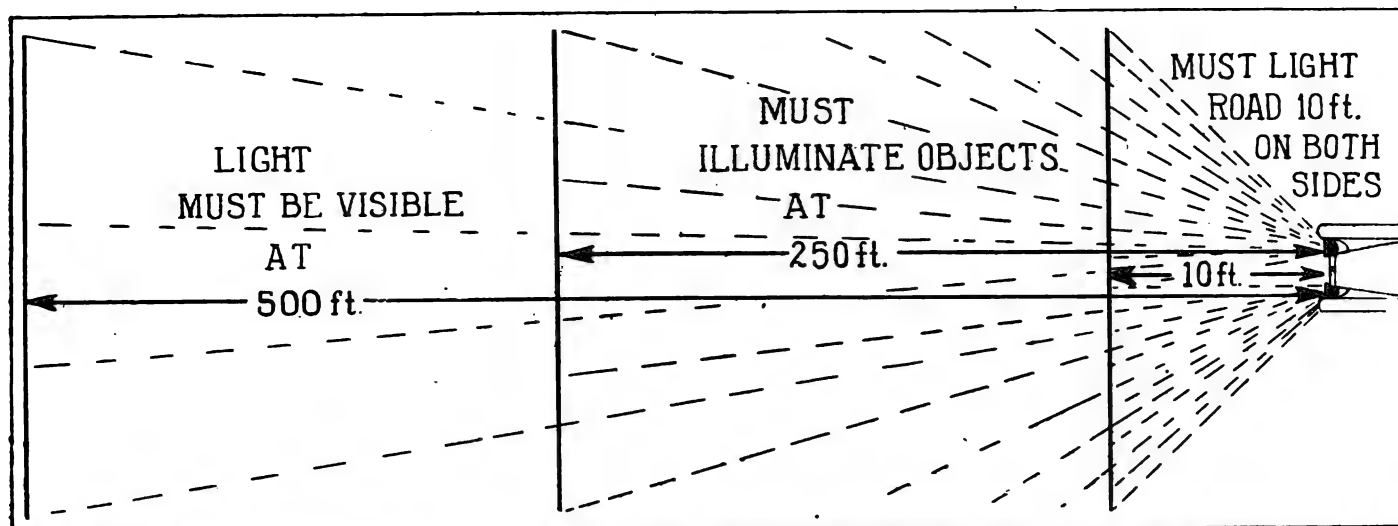


Diagram Showing Necessary Diffusion of Lights and Projection of Rays the Width of the Road—Lamps Meeting These Requirements Cover Intent of Law Throughout the Country.

trouble can be used to direct light on any part of the car where repair work is necessary. The chief objection to it has been due to the fact that numerous motorists leave them turned on and operate them directly ahead, throwing a powerful beam above the cone light of the head lamps and often straight into the eyes of oncoming drivers, so blinding the latter that they can only drive at great risk.

In advocating the abolition of the spot lamp entirely in some states the authorities have been influenced by this action. They have not stopped to consider the many points of merit which are constantly put forward by the manufacturers and publicity in behalf of these lights, and that they are a powerful factor when properly utilized in diminishing the hazard to human life in night riding.

Manufacturers' Efforts to Comply.

H. W. Perry of the National Automobile Chamber of Commerce in commenting on the head lamp situation, states that it will be appreciated that what automobile manufacturers are particularly interested in is how they can make regular lamp equipment comply with all of the laws in the states, and not in a hundred and one devices that they might adopt that might or might not comply with all of the laws.

While the desirability of having 48 different states adopt uniform regulations regarding headlights is apparent, it is realized that this would take a lot of time and a tremendous amount of work. Consequently, Mr. Perry believes that if the manufacturers focus and mount their lamps so as to conform with the S. A. E. recommendation, they will have done their part, and if the authorities in any state refuse to accept this method as complying with the law, it should be up to the dealers and users in that state to equip the lamps with dimmers or special lenses, or have the bulbs or front glass coated according to requirements of the law of their own state.

It really is up to the dealers and users in each state to see that their legislature does not pass a law at such variance with the laws of other states that the manufacturers cannot readily comply with them all is another opinion also advanced by Mr. Perry.

The laws in most states as to the proper focusing of the headlights is an adoption of the requirements specified in the S. A. E. hand book under "Head Lamp Illumination," which reads:

"The head lamps shall be so arranged that no portion of the direct cone of light, when measured 75 feet forward of the head lamps, shall rise above 42 inches from the level of the surface of the road on which the vehicle stands under all conditions of

loading, nor shall any portion of the direct cone of light rise at the 75 foot distance more than 12 inches above the centre of the head lamp.

Work by Automobile Clubs.

All the machinery of established automobile clubs, together with such able work as is contributed by the standardization methods of the S. A. E., are applicable to the headlight situation. Cooperative effort means great strides for progress on this question. Clubs are actively at work.

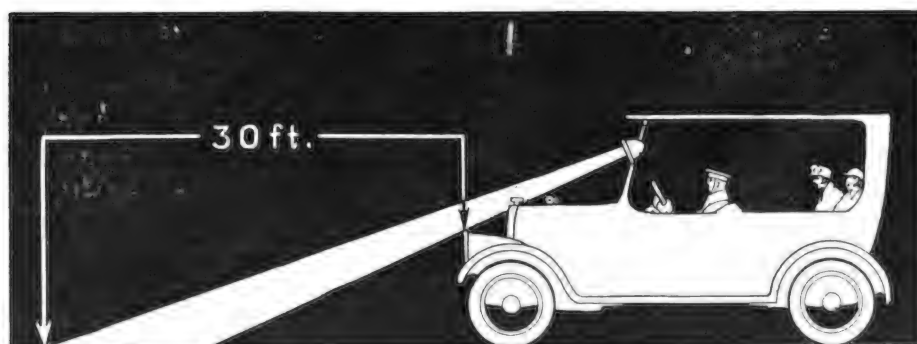
The club attitude is well illustrated in the view of the Cleveland Automobile Club, as is attested by this copious extract from a copy of a circular letter to club members sent to this journal by Fred H. Caley, secretary. It reads:

"The headlight situation is one that should concern every motorist and especially every club member. The state law and city ordinances make it a misdemeanor to have glaring headlights, the beams or rays of which are not within a certain distance above the ground.

"Some of our members have complied with the law with a view of assisting in enforcing ordinances that mean much to the enjoyment of night driving, in addition to proving a safeguard to pedestrians and other highway users. With the many violations it will merely be a question of time before the police take the matter in hand and begin a crusade of wholesale arrests. Why not comply with the law before such action takes place?

"State after state is getting into line to secure proper headlight legislation and you, as a club member, can do much towards making the police regard the motoring fraternity in a kindlier light. You can assist if you have not already done so.

"It behooves you, Mr. Club Member, to equip your headlight in a manner that will eliminate you as a violator. Do it today and tonight you will have added much to your driving pleasure, your safety, as well as to show a willingness to be courteous to the other road users."



Spotlights When Not in Use, or Left Lighted, Should Be Directed on the Road as Indicated in the Diagram.

Lighting Requirements of All the States

FRONT LAMPS.					TAIL LAMPS.					
	Number	Color	Position	Visibility	Illumination	Candle Power	Number	Color	Visibility of Light	Visibility of Numbers
Alabama.....	2	.....	.....	.....	.....	.....	1	red	.....	50 ft.
Arizona.....	2	white	.....	reasonable distance	.....	.....	1	red	.....	.....
Arkansas.....	2	white	.....	at least 200 ft.	.....	.....	1	red	.....	.....
California.....	2	white, amber, yellow	.....	at least 500 ft.	150 ft. ahead*	.....	1	red	500 ft.	50 ft.
Colorado (Den.)..	2	white, amber, yellow	.....	at least 300 ft.	150 ft. ahead	.....	1	red	300 ft.	.....
Connecticut.....	2	.....	.....	at least 200 ft.	150 ft. ahead*	.....	1	red	.....	60 ft.
Delaware.....	2	white	.....	at least 200 ft.	.....	not over 24	1	red	.....	.....
District of C.....	.....	white	1 on either side	at least 200 ft.	.....	.....	1	red	.....	.....
Florida.....	2	.....	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Georgia.....	.....	white	.....	reasonable distance	.....	.....	1	red	.....	.....
Idaho.....	2	.....	.....	at least 200 ft.	.....	.....	1	red	.....	100 ft.
Illinois.....	2	.....	.....	at least 200 ft.	.....	.....	1	red	.....	150 ft.
Indiana.....	2	.....	.....	at least 200 ft.	150 ft. ahead	.....	1	red	.....	100 ft.
Iowa.....	2	.....	.....	at least 500 ft.	.....	.....	1	red	.....	50 ft.
Kansas.....	2	white	.....	at least 300 ft.	.....	.....	1	red	.....	.....
Kentucky.....	2	white	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Louisiana.....	2	white	.....	.....	200 ft. ahead	.....	1	red	.....	.....
Maine.....	2	white	.....	.....	.....	.....	1	red	.....	.....
Maryland.....	2	white	.....	at least 200 ft.	.....	not over 30	1	red	.....	.....
Massachusetts....	2	white	.....	at least 200 ft.	150 ft. ahead*	.....	1	red	.....	.....
Michigan.....	1 or more	.....	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Minnesota.....	2	.....	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Mississippi.....	2	white	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Missouri.....	2	.....	.....	at least 500 ft.	150 ft. ahead	not over 36	1	red	500 ft.	.....
Montana.....	2	white	1 on either side	at least 200 ft.	.....	.....	1	red	.....	100 ft.
Nebraska.....	1 or more	white	.....	reasonable distance	.....	.....	1	red	.....	100 ft.
Nevada.....	2	white	.....	reasonable distance	.....	.....	1	red	.....	.....
New Hampshire....	2	.....	.....	at least 200 ft.	.....	.....	1	red	.....	50 ft.
New Jersey.....	2	.....	.....	at least 250 ft.	.....	.....	1	red	.....	50 ft.
New Mexico.....	2	.....	.....	.....	.....	.....	1	red	.....	.....
New York.....	2	.....	.....	at least 200 ft.	250 ft. ahead*	.....	1	red	.....	50 ft.
North Carolina...	2	.....	.....	.....	.....	.....	1	red	.....	50 ft.
North Dakota....	2	.....	1 on either side	.....	.....	.....	1	red	.....	.....
Ohio.....	2	white	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Oregon.....	2	white	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Pennsylvania....	2	white	.....	at least 200 ft.	.....	.....	1	red	.....	.....
Rhode Island....	2	white	.....	at least 200 ft.	.....	.....	1	red	200 ft.	60 ft.
South Carolina...	2	white	.....	.....	.....	.....	1	red	.....	.....
South Dakota....	2	white	.....	.....	.....	.....	1	red	.....	.....
Tennessee.....	2	white	.....	.....	.....	.....	1	red	.....	.....
Texas.....	2	white	.....	at least 500 ft.	.....	.....	1	red	500 ft.	.....
Utah.....	2	white	.....	at least 250 ft.	150 ft. ahead*	.....	1	red	.....	.....
Vermont.....	2	.....	.....	at least 200 ft.	.....	.....	1	red	.....	50 ft.
Virginia.....	1 or more	white	.....	at least 100 ft.	.....	.....	1	red	.....	.....
Washington.....	2	white	1 on either side	at least 200 ft.	.....	.....	1	red	.....	60 ft.
West Virginia...	1 or more	white	.....	.....	.....	.....	1	red	.....	.....
Wisconsin.....	2	white	.....	reasonable distance	.....	.....	1	red	.....	.....
Wyoming.....	1 or more	white	.....	at least 500 ft.	.....	.....	1	red	.....	50 ft.

*In these states the law stipulating the volume of illumination requires that it be sufficient also to illuminate the road 10 feet to the side of the car at a distance 10 feet ahead of the lamps.

In California, Connecticut, Denver (Col.), Iowa, Maine, Missouri, Nebraska, Nevada, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Utah, Vermont and Washington the regulations covering the beam of light are in brief as follows: Parallel, focalized rays, from lamps of more than 4 candle power, gathered and projected by a reflector, lens or other device, must not raise more than 42 inches above level surface of road on which vehicle stands, under all conditions of load, at a distance of 75 feet or more ahead of lamps. Massachusetts requirements are similar, only that the distance is 50 feet instead of 75, and in Florida and Texas the rays should not shine directly over 48 inches above the level of the road.

Illumination, liberally interpreted, means sufficient light to reveal any person, vehicle or substantial object, and the distance given means the minimum number of feet ahead of the car at which light will have that effect.

In the highway regulations of the District of Columbia it is specified that the tail light be carried on the left side, but the location is not designated in the statutes of the states. Tail lights in Indiana must be independent of other lights and capable of being lighted or extinguished only when the vehicle is stationary.

Blank spaces in the columns indicate that the laws do not specify any regulations under that caption.

Spotlight or Searchlight Regulations

Alabama—No provision.

Arizona—No provision.

Arkansas—No provision.

California—Deflection of beam subject to headlight requirements.

Colorado (Denver)—Deflection of beam subject to headlight requirements; must not sell, offer for sale or have in possession with intent to sell, any vehicle equipped with lighting device of over four candle power with reflector, unless same complies with special lighting law.

Connecticut—Deflection of beam subject to headlight requirements; must not be directed in face of approaching driver.

Delaware—Light must be projected on road not exceeding 10 feet ahead of car; used only for accidents, reading signs and numbers and examining edge of road; must not be used as permanent headlight or for driving.

District of Columbia—Must be equipped with dimming device.

Florida—Must be deflected so beam will not rise over four feet above road level.

Georgia—No provision.

Idaho—No provision.

Illinois—In Chicago, must not sell, offer for sale or have in possession with intent to sell, any vehicle equipped with lighting device of over four candle power with reflector, unless same complies with special lighting law.

Indiana—Must be equipped with dimming device; light must be projected directly upon road not exceeding 50 feet ahead of car.

Iowa—Deflection of beam subject to headlight requirements; light must not be thrown in face of approaching driver.

Kansas—Must be equipped with dimming device and must not be thrown in face of approaching driver.

Kentucky—No provision.

Louisiana—No provision.

Maine—Must not be used as permanent headlight or for driving; and should be used only when car is stationary, in reverse or at slow speed and must not be thrown in face of approaching driver.

Maryland—No provision.

Massachusetts—No provision.

Michigan—Must be equipped with dimming device and must not be thrown in face of approaching driver.

Minnesota—No provision.

Mississippi—No provision.

Missouri—Must be directed down while driving and used only in emergencies in cities and towns.

Montana—No provision.

Nebraska—Must be projected directly upon road not exceeding 30 feet ahead of car.

Nevada—Must be equipped with dimming device and must not be thrown in face of approaching driver.

New Hampshire—Must be equipped with dimming device and must not be thrown in face of approaching drivers.

New Jersey—Must be used only for reading signs and house numbers and not as a permanent headlight or for driving.

New Mexico—No provision.

New York—Deflection of beam subject to headlight requirements.

North Carolina—Deflection of beam subject to headlight requirements.

North Dakota—Deflection of beam subject to headlight requirements; must be projected directly upon road not exceeding 30 feet ahead of car.

Ohio—Deflection of beam subject to headlight requirements; light must not be thrown in face of approaching driver and must be projected directly upon the road not exceeding 50 feet ahead of car, and not exceeding 60 feet when approaching another car.

Oregon—Deflection of beam subject to headlight requirements.

Pennsylvania—No provision.

Rhode Island—No provision.

South Carolina—No provision.

South Dakota—Deflection of beam subject to headlight requirements.

Tennessee—No provision.

Texas—Deflection subject to headlight requirements, must not project over 48 inches above level of road.

Utah—Deflection of beam subject to headlight requirements; must be projected directly upon road not exceeding 30 feet ahead of car.

Vermont—Deflection of beam subject to headlight requirements; must be projected directly upon road not exceeding 30 feet ahead of car; light must not be thrown in face of approaching driver.

Virginia—No provision.

Washington—Deflection of beam subject to headlight requirements; light must not be thrown in face of approaching driver; must not sell, offer for sale or have in possession with intent to sell, any vehicle equipped with lighting device of over four candle power with reflector, unless same complies with special lighting law.

West Virginia—No provision.

Wisconsin—No provision.

Wyoming—Must be equipped with dimming device and must only be used in emergency and for rounding turns.

Dimming, Shading and Regulations for Diffusion

Other regulations of headlights in the different states are classed as to their relation to dimming devices and their control. Headlights must be dimmed or shaded, or rays diffused to prevent glare, by some coating or other device in the following states: Delaware, Florida, Chicago, Ill.; Indiana, Kansas, Maine, Michigan, Missouri, Nevada, New Hampshire, New Jersey, Ohio, Oregon, South Dakota, Texas, Wyoming. In Illinois and Michigan the devices must be so constructed that they can be manipulated at the will of the driver and in New Jersey they must not be capable of being operated from driver's seat if lamp can project rays more than 4½ feet above road.

In New Jersey and New Hampshire dimming devices and lenses must meet with the approval of the commissioners of motor vehicles; in Chicago by the motor vehicle light inspection and in the District of Columbia by the commissioners of the district.

The public utilities commission of Maine and the state board of public

roads of Rhode Island have power to promulgate headlight regulations.

In Chicago the manufacturer, distributor or wholesaler of automobiles may affix a tag upon lighting equipment showing that same has been inspected by the board of motor vehicle light inspection and approved.

Cities Grasp Trailer Economies.

Municipal trailers are a motive economy brought to prominence by the new haulage, labor and traffic problems occasioned by the great war. Cities announced by the Troy Wagon Works Co., as using their trailers include Detroit, Minneapolis, St. Paul, Duluth, Montgomery and Birmingham, Ala., Binghamton, N. Y., Buffalo, N. Y., and Cleveland, O. Trailer installations in all these municipalities it is claimed, have resulted in expedition of improvement work that stood in danger of failing of accomplishment as their equipment stood.

Philadelphia Automobile Trade Show.

The 1918 automobile show of the Philadelphia Automobile Trade Association will be held in the Commercial Museum Building, in that city from January 11 to 19 inclusive. The show committee is composed of; chairman, John Fassitt of the Pierce Arrow; Albert E. Maltby of the Winton; J. E. Gomery of the Hudson; Louis C. Block of the Ford and Lee J. Eastman of the Packard.

Homer McKee Becomes Distributor.

Homer McKee, advertising director of the Premier Motor Corp., and at one time advertising manager of the Cole Motor Car Co., has organized the Homer McKee Co., Inc., at Cleveland, O., where the concern will act as distributing agents for the Premier car, J. Y. Tractor and Hoosier Sub Carburetor. Associated with him in the business are Aaron Wolfson and Fred H. Hoover.

NO TURNING OF CUSTOMERS AWAY

Used Car System Adopted by Dealer in Valley Town Off the Beaten Track a Pointer of Modern Business

MR. DEALER, do you turn away one customer a day who comes to your place to buy a used car?

If so, you are piling up over 300 points a year toward the prospect of sending an accumulating used car stock to the auction block, or carrying it in storage, at a positive loss. This is the road to uncertain and possibly large sacrifices, whereas quick sale methods at a smaller margin recommend themselves to many dealers as a positive working plan to avoid loss on a particular class of stock such as the traded in car.

A dealer not far from Boston has a habit of meeting an intending purchaser with recessions from the marked price on his used cars to such an extent that it cuts down to a minimum the departure of a patron without taking the goods away with him. If this dealer has a used car on hand on which he has set for himself a profit of \$50, for instance, he will not refuse a tender from a person who looks at it at a lower price. He will even let a car go that nets him \$10 instead of the \$50 he had decided upon. From several years of this policy he has learned that it pays to make a quick turnover on goods on hand, and especially so in the case of the resale of a car.

No dealer bases his general business progress or his full measure of profits on the resale of cars. Too often it is the case that insufficient attention is paid to this end of the business and that the accumulation of odds and ends assumes proportions which threaten to overshadow the regular line. It certainly will

if such stock is allowed to drag. The surest preventive against accumulations is to move the stock by applied sound business methods of the modern era.

The way of the small dealer previously mentioned is to let the customers come to him. Off the beaten track, in a side valley, he keeps going season after season, and the reputation of his car bargains extends far beyond the confines of the valley neighborhood, and in fact of the state. Buyers come to his shop from scores and hundreds of miles. What is this but advertising? Undoubtedly it is to be classified as advertising of the finest sort.

Applied to a denser community or to a business on a larger scale the import is that through well placed advertising the same effect is to be gained. Much has been said in the journal from time to time of the importance of placing cars in the best of mechanical condition, as well as the importance of proper display of the wares, the maintenance of a clean shop as primary steps in the reduction of a prejudice against used cars. All this is true and much more.

Used car buying tends to get away from the hands of professional traders with every time the local dealer takes the grip on the question that is needed. One very important thing is as far as possible to move the stock himself in his own territory.

The central or cooperative clearing house is not available to every section, perhaps, although it may be increasingly

so. Nevertheless there are methods available that the progressive, wide-awake dealer does not have to go out of his own shop to grasp. The adoption of quick, live sales reduces the number of customers turned away. They spell the difference between a profit, modest or low as it may be, and a positive loss by the auction block route.

Auctions are usually resorted to where it is necessary to immediately convert into cash goods in an estate or stock that has become burdensome and the prices obtained at such sales are never a real criterion of actual values; they have more the character of bargain counter values.

This plan of disposing of surplus used cars has been used by a dealer in Providence, R. I., for several years, and while the prices realized are small, the dealer succeeds in quickly ridding himself of the stock and does it at slight expense. He recovers the capital tied up in the machines and stops the expense of extra rentals made necessary by the storage space occupied by the cars if carried along.

There were about 23 cars actually sold at an auction recently. The highest price realized was \$400, paid for a 1915 Chalmers sedan model 26 B. The other cars brought from \$74 up. About a hundred persons gathered at the sale, including second hand car dealers from other cities, individual purchasers and junk dealers. Bidding was not spirited, as the crowd seemed to take the attitude from the first that if they did not get a bargain at first they would by waiting.

New York Has Street Flusher Fleet.

The city of New York has installed a fleet of 12 monster automobile street flushers, each having a capacity of 1800 gallons and weighing 15 tons. The machines are equipped with Firestone Giants, 14 inches in width and 40 inches in diameter.

Gen. Goethals Heads Aircraft Corp.

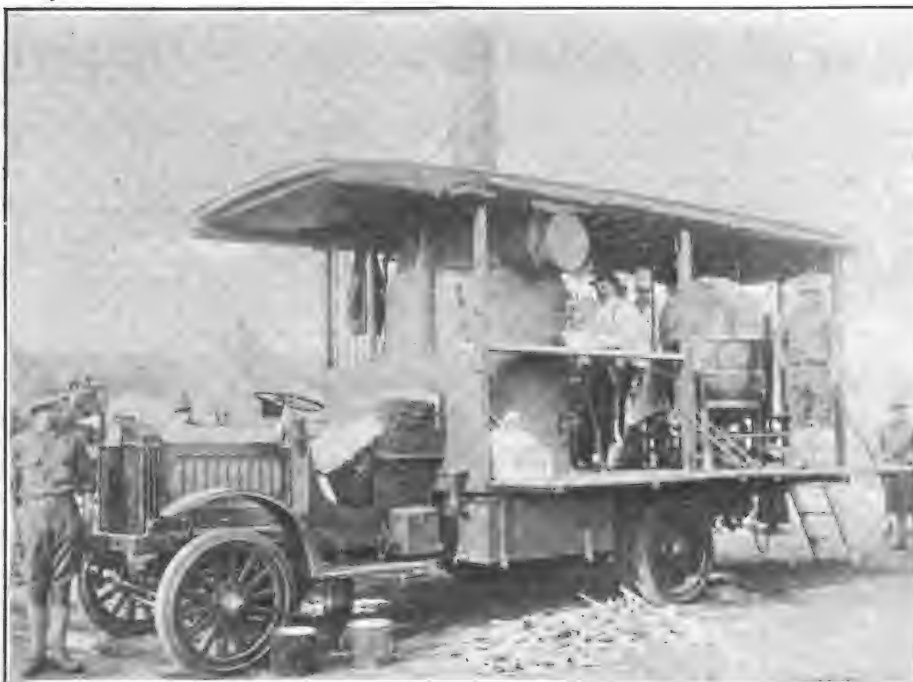
Maj. Gen. George W. Goethals, the builder of the Panama Canal, has been appointed president of the Wright-Martin Aircraft Corporation. He has also been elected a director, together with Marshall J. Dodge.

Sweden to Save Gasoline.

Motorists in Sweden will hereafter be obliged to secure permits for the use of gasoline from the Industrial Commission of that country, according to a Royal decree recently issued.

Chevrolet Shipments Rise.

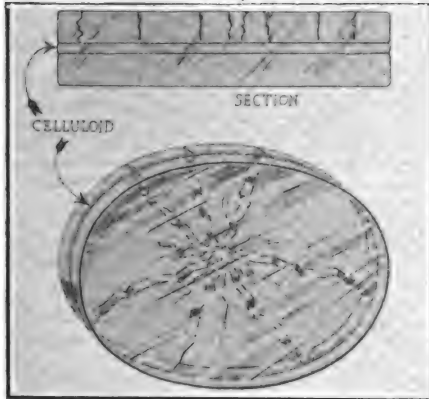
For the week ending Sept. 29 the Chevrolet Motor Co. shipped 3502 cars, as compared with 1664 cars in the corresponding week of the previous year.



Mobile Army Kitchen on a Riker Truck Chassis, Now in the Service of the U. S. with What Is Known as the Taft Unit.

An Unbreakable Glass for Goggles.

To meet hazards to the eye such as constantly confront the garage men or repair men, as well as the traveling motorist, Strauss & Buegeleisen, 37 Warren street, New York, announce a new product called Resistal, a safety goggle glass. They form a valuable addition to the mechanical preventatives of injury from bits of flying steel, metal or lathe



Construction Sketches of Resistal Goggle. turnings, pebbles from the road or flying insects. The government is taking large numbers to protect the eyes of air scouts from shrapnel hits.

Against hard blows ordinary glass is apt to give way, fractured and broken pieces entering the eye may cause blindness, so the Strauss & Buegeleisen Co. have produced an article which is something of a marvel of applied mechanics in addition to its highly useful offices toward safety and comfort. In its construction, Resistal is made of two layers of optical glass, with a layer of celluloid interposed, the whole being welded, not cemented, into a solid mass. The accompanying illustration shows, clearly, how in case of a blow or accident the shattering of the superimposed layer of glass will be stopped at the celluloid layer.

Automobile Liberty's Aid.

Motorists are helping the second Liberty Bond issue this month with characteristic vigor and enthusiasm. Thousands of windshields carry the legend "Buy a Liberty Bond" in numerous forms. In the early stages of the war flag carriers furnished the motorists with outward expression of their patriotism, while in the present stage the consecration of the windshields to advertising Liberty Bonds shows increasing devotion.

Motorists and others who see these lines lend for victory!

Nearly Million Workers in Industry.

According to Roy D. Chapin, president of the Hudson Motor Car Co., there are now over 915,000 workers in the United States engaged in some of the branches of the automotive industry. This announcement was included in a statement made by Mr. Chapin during an address before the New York Bankers' Association on the economic aspect of the trade.

A GLIMPSE AT USED CAR VALUES

More Quotations on Resale Vehicles by the Largest Dealers in Leading Eastern Cities

In the sample advertisements reproduced here one can find a fair representation of the market value of all the popular cars in the used car stage and these quotations are a fair criterion, as they are asking prices of the largest dealers in these cities. Extensive variations may be found in certain instances owing to specific conditions affecting a car's value contrary to the average rule, but in most cases it will be found that values are maintained evenly on cars of the same type and year.

NEW YORK CITY.

1915 CHANDLER Touring.
1915 COLE Light 6 Touring.
1915 CHEVROLET Touring.
1914 BUICK Touring.
1914 HUPMOBILE Runabout.
1916 FORD Touring and Runabout.
BISHOP, McCORMICK & BISHOP, INC.
1243 Fulton St., Brooklyn.

An Unusual Car List.

1917 CADILLAC Touring.
1917 CADILLAC Landaulet.
1917 CADILLAC Roadster.
1917 CADILLAC Brougham Limousine.
1917 STUTZ Bulldog Special.
1917 KISSEL Touring.
1917 LIBERTY Touring.
1917 SCRIPPS-BOOTH, never run.
1916 WILLYS Special, boat body.
SCHOONMAKER & JACOD,
1700 Broadway.

Bargains in Select Used Cars.

1917 STEARNS Limousine.
1917 SINGER Touring.
Almost new McFARLAN "6."
1917 MARMON Chummy Roadster.
1917 MITCHELL Town Car.
1917 SCRIPPS-BOOTH Roadster, model G.
Series 1917 STUDEBAKER, \$575.
MERCER Speedster.
1916 WHITE Touring.
1916 KISSEL KAR, Victoria Brougham.
1916 CHALMERS, \$625.

1916 OVERLAND Roadster, \$350.
Time Payments Arranged.
Trades Considered.
NEW YORK MOTOR CAR EXCHANGE.
237 West 55th St.

PROVIDENCE.

1916 FRANKLIN Berlin Limousine.
1916 COLE, 7-passenger, Touring.
1916 DODGE Touring.
1916 KING Touring.
1915 CHALMERS Touring.
1914 PACKARD 2-38 7-passenger Touring.
1913 PIERCE-ARROW 6-48 Limousine.
1916 CADILLAC 7-passenger Touring.
1915 CADILLAC 7-passenger Touring.
1915 CADILLAC 5-passenger Touring.
1914 CADILLAC 7-passenger Touring.
1914 CADILLAC 5-passenger Touring.
1913 CADILLAC Touring.
1913 CADILLAC Roadster.

We will take your old car in exchange.
Time payments if desired.

CADILLAC AUTO CO. OF R. I.
773 Broad St.

1916 FORD TOURING.

Newly painted, demountable rims, mechanical condition good; side curtains have never been put on; a bargain; terms.

1916 FORD TOURING.

Demountable rims in good mechanical condition; very attractive price; terms.

1916 FORD TRUCK.

Has just been overhauled; new tires and brand new body; price right; terms.

1917 CHEVROLET TOURING.

Demountable rims, lock switch, etc.; has been run only 3000 miles; here is a chance to get a high grade car for a little money; terms.

1916 FORD PANEL DELIVERY.

A chance to get a good business wagon at \$225; easily worth \$275.

Before buying a Ford car get in touch with us; we can positively save you money; terms to responsible parties.
EDWARDS & LANPHEAR MOTOR CAR CO.,

17-19 Snow St, Providence, R. I.

1917 OAKLAND Touring car; run 500 miles; better than new; with extras, \$690.



Henry M. Leland, Now a Maker of Aircraft, Landing from His First Aeroplane Flight with Ruth Law, in Florida, Only a Couple of Seasons Ago.

DODGE Touring car; in fine shape; tires and paint like new; others ask \$650; our price \$490.

1916 and 1917 DODGE Touring cars \$490 up; like new.

Model 83 Rebuilt 1916 OVERLAND Touring car; a real family car that we guarantee until Jan. 1. It will pay you to see it and try it out.

1916 SAXON Six Touring; like new; thoroughly overhauled; a snap at \$550.

COLE 6-passenger Touring car; in fine order; a snap at \$590.

Guaranteed OVERLAND Touring car; 5-passenger; in fine condition; guaranteed to Jan. 1; \$350.

MAXWELL Touring car; fine order; like a new car; if sold by Wednesday, \$390. Extra snaps; price cut to \$250 from \$450 to \$500; BUICK Roadsters; five of these; MARION Touring cars; CADILLAC Touring car.

Two METZ Touring cars; if you are looking for the most for your money see these at our prices; \$250 up.

PUGH BROS.,

53 Mathewson St, Providence, R. I.

BOSTON.

1915 LOCOMOBILE Limousine; been used by private family near Boston and positively looks and runs like a brand new car; excellent reasons given by owner wishing to dispose of this high grade perfect car; guaranteed fully.

1916 CADILLAC Touring, \$1050; run less than 4000 miles; as owner has been away for five months; guaranteed in perfect condition throughout and thoroughly

demonstrated.

STUDEBAKER Roadster, \$675; series "18," cost \$1100 and only run 325 miles; owned by young lady who is going away to school and has no further use for it; full guarantee and thorough demonstration. APPERSON Chummy Roadster, \$750; finest possible condition; always had excellent care and is speedy, powerful and easy riding; call for this fine trade.

1916 HUDSON Cabriolet, \$800; model 6-40; always owned and driven by elderly couple and used very little; these owners have no further use for a car and will sacrifice for quick sale; call for thorough demonstration and genuine bargain.

1916 OVERLAND Roadster, \$375; model 83; been thoroughly refinished throughout and positively cannot be told from a brand new car; all good shoes and extra; call for genuine bargain.

"38" PACKARD Limousine, \$750; just been thoroughly overhauled and repainted and looks and runs like a brand new car; has electric self-starter and lights and all extras; a fine family or renting car.

1917 HUDSON Cabriolet, \$1550; almost brand new; run less than 2100 miles and is in perfect condition throughout; very latest model; all new shoes and paint perfect; call and ride in this popular all-year-round car; guaranteed.

1916 STUTZ 4-passenger, \$1150; regular touring model, divided front seats and is mechanically perfect; very powerful and speedy and climb any hill; call for thorough demonstration of this popular car.

1917 MITCHELL Touring, \$750; this fine light family touring car seats seven and

is inexpensive to operate and very easy riding; plenty of power and quiet running; all good shoes and original paint is perfect.

1916 PAIGE Touring, \$575; this fine light six-cylinder, 7-passenger touring car has been thoroughly overhauled and looks and runs like a new car; all fine shoes, etc.; this trade must be seen to be appreciated. 1916 STEARNS Touring, \$575; silent Knight; 4-cylinder and just like new throughout; all fine shoes and original paint perfect; light and inexpensive to operate and easy riding.

GEORGE GROW,

321-323 Columbus Avenue, Boston, Mass.

1916 CHANDLER Roadster, \$550; ready for the test, easy riding, powerful and economical; must be seen to be appreciated; fully guaranteed.

1916 CHANDLER, \$550; touring; mechanically in first class condition; very fine for small family; fully guaranteed and demonstrated.

RENAULT Limousine; just the car for renting; very economical and good for a lifetime; in fine condition and has special built body; call and look this over.

1917 FORD Roadster, \$295; original tires; run about 1200 miles; shock absorbers and runs like new; needs a wash and you have a new car; call early.

1916 OLDSMOBILE "8," \$650; powerful, quiet and comfortable; newly painted and overhauled; cannot be told from new; call and ride.

METROPOLITAN USED CAR CO.,

16 Columbus Avenue, Boston, Mass.

Boston Holds Closed Car Week for Motorists

NEW ENGLAND motorists were the guests this week of the Boston Automobile Dealers' Association at a closed motor car week held in Boston. It was the first exhibition of its kind held in the East and presented many novel features. The exhibits were not housed under one roof, but each of the 100 dealers in Boston held individual displays of their enclosed models at their show rooms, the latter being especially decorated for the occasion with bunting, extra lighting effects and floral settings.

Many of the dealers, in addition to the complete line of enclosed types, exhibited special jobs embodying new features, refinements and improvements that proved of great interest to those who enjoy their cars the year around. Over 30,000 invitations were sent out and there was a liberal response. In addition to dealers from all parts of New England many motorists made special trips to the city to inspect the many models of winter cars. Motorists soon learn that with the enclosed body they can enjoy the fall and winter motoring without experiencing any discomforts from the weather. The majority, however, have been slow to appreciate the advantages of the enclosed car or convertible type, and as an educational measure toward appraising the public of the value of this type of car the Boston dealers staged their show.

Very appropriate settings were employed by many dealers to give a seasonal tinge to their display, one exhibitor using his display window for a winter sporting scene, showing a party of tourists camped in the woods, and another showing a party out on a sporting trip

with skates, snow shoes, skis, toboggans set about, giving a realistic touch to the setting, while a convertible sedan in the background immediately suggested the refuge and comfort to be obtained from the cold whenever the party should turn homeward.

This exhibition was in the Overland and Willys-Knight agency. An autumnal atmosphere was produced in other stores through the use of fresh cut branches from oak trees, the leaves having taken on their multicolored dress, and created a beautiful background for the cars. In the Boston Buick company the full line of Buick enclosed cars was shown in an autumnal garden. The Hinchcliffe Motor Car Co., Kissel Kar agents, opened their All-Year Car Show on Saturday, at the close of the week with the sedanlet as the feature of the All-Year Kissels.

In the Pierce-Arrow closed car line shown at the J. W. Maguire company, the motorist saw the last thing in body luxury, and the coach builders are exemplified in its highest form, as well as sumptuous equipment and fittings. The Pierce-Arrow company for almost as many years as the motor industry has been alive, have specialized in luxurious enclosed bodies, and while they developed a very perfect type many years ago, each year their designers are able to add or alter some little fitting that has worked toward a perfection of the car.

At the sales rooms in the big Packard plant on Commonwealth avenue the most conspicuous exhibit in the complete line of enclosed body types, was a special job town cabriolet model. The interior is upholstered in Chace tapestry of Kentucky

rose design and the fittings include a toilet case, cigar lighter, mirror, dome lights and audophone, which enables the occupants to communicate with the chauffeur by speaking in a natural tone and without raising a transmitter to the lips.

In looking over the 500 odd models of enclosed cars on display at the different dealers' show rooms, one is convinced, contrary to general expectations, however, that this type of car is not alone for the wealthy or rich man, but is a convenience within reach of the average motorist. Another striking feature also is that the moderate priced enclosed cars have all the essential points making for comfort as are embodied in the high priced cars.

At the Jackson Motor Car Co. the latest Jackson body creation for 1918 was on display. It is fitted to the new type "eight" chassis and has many distinctive features which make it exclusive in its class. The hood is high and has a graceful contour and the construction is of the highest class of coach work, while the exterior and interior finish is equal of that on the most expensive cars.

Other attractive exhibits included those of the Marmon at F. E. Wing's; the Stearns at the J. H. MacAlman show rooms; Oldsmobile all-season cars shown by the Oldsmobile company of New England; Paige-Detroit by the Paige-Detroit company of New England; Nash cars by C. P. Rockwell; Reo by J. M. Linscott; Elgin Six by the Bryant G. Smith & Sons Co.; Scripps-Booth by Scripps-Booth Motor Car Co., and the Haynes by the W. L. Russell company.

Traction Feats All in the Day's Work

WITH the increase of transportation facilities, civilization has made rapid steps forward. The war, however, has tied up much of the rolling stock, so that private shipments are somewhat delayed and the manufacturers are finding trouble in moving machinery. The motor truck or tractor is the best solution of the problem and affords at times a more convenient method of moving machinery than railroads. The illustration shows how a tractor with trailer attachment may be used for heavy hauling. This tractor and semi-trailer is carrying a load of 12 tons over the city streets from New Jersey to New York,



Top Field Casting of a Converter Hauled by Tractor for the Westinghouse Co. to McComb Dam, Harlem River, N. Y.

ing tractor is the logical solution to his problem. With it he can plow, harrow, harvest, in fact do practically all of the work required with the minimum amount

the machine and one operator may plow a field is many times greater than that of a horse, plow and driver.

Home Made Tractor Utility.

A farmer near Saskatoon, Can., removed the rear wheels of his car, substituted a pair of wheels from his binder and proceeded to lighten the labor on his farm. In a year this is what the machine did: Plowed 50 acres, sowed 175 acres, cut 175 acres, fallowed 40 acres and broke 10 acres. The cost of transformation was \$40 and of operation \$140. The same work, it is computed, would ordinarily occupy six horses and several extra men.

International Opens New Plants.

The International Rubber Co. has opened two new factory units at Denver, Col., and work has already begun on a four-story addition which will add 90,000 square feet of floor space to their plant. With these additions in operation the company's output will be doubled. With the completion of the new unit the annual production will total 600,000 Bates Half-Sole tires.



Plowing Heavy Stubble Land with a Model J 10-20 Horsepower Sandusky Tractor, Hauling Three Bottoms.

much easier and quicker than the load could have been handled by freight.

That the large manufacturing concerns appreciate the value of trucks and tractors for hauling heavy loads is proven by the accompanying illustration, which shows a section of a converter being carried upon a tractor and semi-trailer from the Westinghouse company's works to Jerome avenue, New York. This means of transportation is very favorably received because all changes and chances for breakage by transfer from one vehicle to another are eliminated.

The farmer of today is facing one of the biggest problems that he has ever met—scarcity of help. The shortage of men has always been one of his handicaps and the shortage is being felt to a greater extent at the present time than ever. To make a reasonable profit and make the best of his investment in the farm, the farmer must cultivate all of the available land, but this he cannot do without help, unless he takes advantage of up-to-date farming tools. The farm-

of help. The illustration shows how a tractor may be utilized for hauling a three share plow. The speed at which



Boiler Weighing 12 Tons Hauled from the Knox Hat Factory at Boonton, N. J., to New York City.

Three Per Cent War Tax on Automobile Industry

THE War Revenue Bill was signed by President Wilson on Wednesday, October 3. Its most important relation to the interests of the motor car industry and motorists is contained in the provision for a 3 per cent. tax on all motor vehicles, including trucks, payable by manufacturers, producers and importers. This tax it is understood will be levied against the amount the maker receives for his product, and automatically went into effect the day after it was signed.

Alfred Reeves, General Manager of the National Automobile Chamber of Commerce, in a special bulletin explaining the provisions of the bill, says that our Congressmen and Senators at Washington will find that the automobile industry will patriotically assume the excess burden that has been placed upon it and continue to co-operate with the government authorities in doing everything it can to help in the present national crisis.

The interpretation placed upon the sections of the bill covering the tax on automobiles is that there shall not be a tax on cars held by retailers but that on cars held by wholesalers at the time the bill becomes a law, there shall be paid a tax of 1½ per cent. (being one half of three per cent. tax). This tax shall be paid by the wholesaler so holding such article. It probably will not include second hand cars.

The manufacturer may deduct 5 per cent. of the amount paid for the tires from the amount of tax paid on each vehicle, including the inner tubes on such vehicles.

While the tax does not apply to cars that have been bought and paid for by

dealers, the 1½ per cent. rate is charged against the wholesaler on the cars which he has on hand at the time the law went into effect.

As the method of collecting the taxation works out, the seller collects the amount of the tax from the dealer and makes monthly returns to the United States.

Mr. Reeves is of the opinion that cars or trucks sold to the United States Government will be exempt from the tax, or if not, the tax can be added and returned through the Revenue Office. In the case of the automobiles sold to our allies, the tax will have to be added to the regular price and paid by such foreign governments.

Following are the sections of the War Revenue Bill affecting the automobile industry:

TITLE VI.—WAR EXCISE TAXES.

Section 600.—That there shall be levied, assessed, collected and paid

(a) Upon all automobiles, automobile trucks, automobile wagons, and motorcycles sold by the manufacturer, producer, or importer, a tax equivalent to 3 per centum of the price for which so sold;

From the tax which otherwise would be imposed upon a manufacturer, producer, or importer of automobiles, automobile trucks, automobile wagons, or motorcycles there shall be deducted an amount equivalent to 5 per centum of the amount paid for the tires, including inner tubes, on such vehicles by such manufacturer, producer, or importer;

Section 602.—That each manufacturer, producer, or importer of the articles enumerated in section six hundred and one (Sporting Goods division) shall make monthly returns under oath in duplicate and pay the taxes imposed on such articles by this title to the collector of internal revenue for the district in which is located the principal place of business.

Such returns shall contain such information and be made at such times and in such manner as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may by regulations prescribe.

That upon all articles enumerated in subdivisions above which on the day this act was passed are held and intended for sale by any person, corporation, partnership or association other than a retailer who is not also a wholesaler or the manufacturer, producer, or importer thereof there shall be levied, assessed, collected and paid a tax equivalent to one-half of the tax imposed by each such subdivision upon the scale of the articles therein enumerated. This tax shall be paid by the person, corporation, partnership or association so holding such articles.

The taxes imposed by this section shall be assessed, collected, and paid in the same manner as provided in Section 1002 in the case of additional taxes upon articles upon which the tax imposed by existing law has been paid.

Nothing in this section shall be construed to impose a tax upon articles sold and delivered prior to May 9th, 1917, where the title is reserved in the vendor as security for the payment of the purchase money.

TITLE X.—ADMINISTRATIVE PROVISIONS.

Section 1007.—That (a) if any person, corporation, partnership, or association has prior to May ninth, nineteen hundred and seventeen, made a bona fide contract with a dealer for the sale, after the tax takes effect, of any article upon which a tax is imposed under Title III, IV, VI, (covering tax on Automobiles) or IX, or under subdivision fourteen of Schedule A of Title VIII, or under this section, and (b) if such contract does not permit the adding of the whole of such tax to the amount to be paid under such contract, then the vendee shall, in lieu of the vendor, pay so much of such tax as is not so permitted to be added to the contract price.

The taxes payable by the vendee under this section shall be paid by the vendor at the time the sale is consummated, and collected, returned and paid to the United States by such vendor in the same manner as provided in section five hundred and three.

The term "dealer" as used in this section includes a vendee who purchases any article with intent to use it in the manufacture or production of another article intended for sale.

Section 1002.—That where additional taxes are imposed by this Act upon articles or commodities, upon which the tax imposed by existing law has been paid, the person, corporation, partnership or association required by this act to pay the tax shall, within thirty days after its passage, make return under oath in such form and under such regulations as the Commissioner of Internal Revenue with the approval of the Secretary of the Treasury shall prescribe. Payment of the tax shown to be due may be extended to a date not exceeding seven months from the passage of this Act, upon the filing of a bond for payment in such form and amount and with such sureties as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may prescribe.

War Camp Recreation.

John N. Willys, president of the Willys-Overland Company has been appointed chairman of the National Committee on War Camp Community Recreation.

COMING EVENTS

RACING CONTESTS.

Chicago, Ill., master drivers..Oct. 11-12-13
Richmond, Va., track race.....Oct. 13
Chicago, Ill., speedway race.....Oct. 13
New York, speedway race.....Oct. 27
Columbus, O., Dixie tour.....Oct. 24

SHOW CALENDAR.

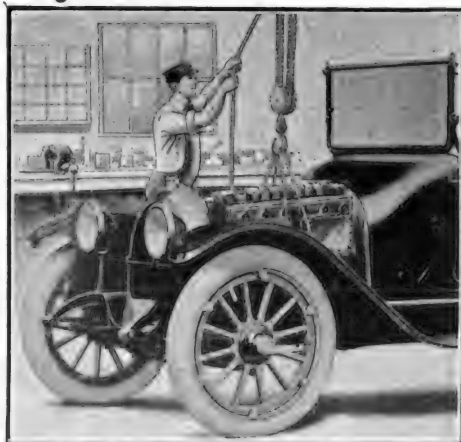
Boston, Mass., closed car show..Oct. 6-13
Cincinnati, O., dealers' show..Oct. 6-13
Dallas, Tex., Automobile and Accessory Dealers' Association.....Oct. 13-28
Syracuse, N. Y., first annual used car show.....Oct. 22-26
Worcester, Mass., show auspices United Shows Co.....Oct. 22-29
Denver, Col., automobile show..Nov. 12-18
Los Angeles, Cal., automobiles and accessories show.....Nov. 12-17
Springfield, Mass., show auspices United Shows Co.....Dec. 3-9

New York, national automobile showJan. 5-12
Washington, D. C., carnival and open house week.....Jan. 11-18
Montreal, Can., national motor show.....Jan. 19-26
York, Pa., dealers' show.....Jan. 21-26
Chicago, Ill., national automobile showJan. 26-Feb. 2
St. Louis, Mo., manufacturers' and dealers' show.....Feb. 11-16
San Francisco, Cal., automobile show.....Feb. 16-26
Boston, Mass., Boston Automobile Dealers' Association show, Mechanics' building.....March 2-9

MEETINGS.

New York, Automobile Electrical Association.....Jan. 3-4
New York, National Association of Automobile Accessory Jobbers..Jan. 11-16

Overhauling *The* Automobile



DODGE BROTHERS CAR

This is the seventh of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The eighth article of this series, which will appear in the Oct. 25th issue of the Automobile Journal, will be devoted to the Cadillac car.

THERE have been but few radical changes in the Dodge Brothers car since its first appearance and it is the purpose of this article to cover practically all of the models now in use. Aside from a slight change in the gasoline and ignition systems, the engine remains practically the same as originally designed. It is of the removable L-head type with the intake manifold cast integral with the cylinder block.

The first step in the overhaul is the draining of the water and removal of the radiator which is held to the frame by two bolts, one upon each side of the center. The water hose connections should be unclamped and removed. The secondary wires should next be marked with tags and disconnected from the plugs. After the secondary wire retaining fibre has been unfastened, the distributor cap with wires may be lifted from the distributor and the secondary assembly removed from the car. Where the engine is equipped with the Delco system, the wire leading from the distributor to the coil must be removed before taking off the distributor cover. In every case the greatest care must be observed not to loose the distributor brush.

The gasoline should next be drained from the vacuum

system by removing the filter cap which is located beneath the carburetor float chamber. This will allow all of the gasoline to escape from the vacuum tank and feed line. To drain the carburetor float chamber the gasoline needle valve cap which is located at the top of the float chamber should be removed and the needle valve lifted from its seat, allowing the escape of the gasoline from the carburetor. After the fuel tube from the gasoline tank and the control rods have been disconnected, the tank and carburetor may be unbolted and the whole assembly removed from the car.

As a general rule all fuel lines should be cleaned as often as possible. This may be accomplished by blowing compressed air through the tubes, by running a stiff wire through them, or by flushing with kerosene. The fuel line which leads from the tank to the vacuum chamber may be blown out by the first method, after the tank filling cap has been removed. Unless the carburetor or vacuum tank have been causing trouble they should not be disturbed. The carburetor is fitted with a filter screen at the inlet valve, below the float chamber. This screen should be cleaned, and is the only part of the carburetor that might require special attention.

Work on Engine Parts.

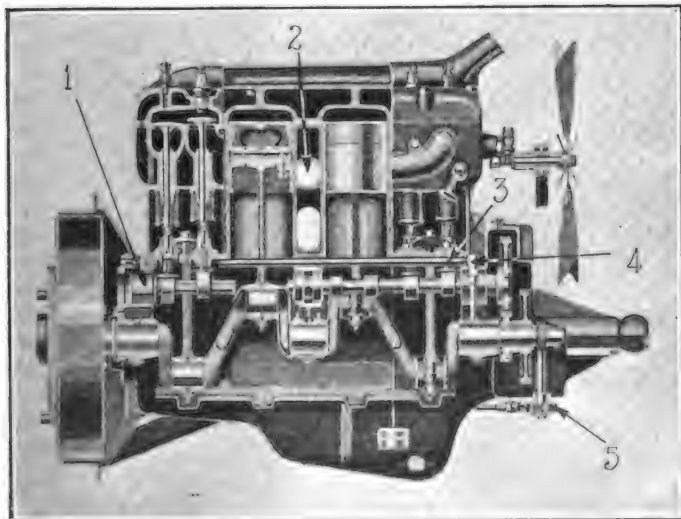
After the 14 nuts which fasten the cylinder head to the engine block have been taken off, the head may be removed from the engine, exposing the cylinders, pistons, and valves. From these parts the carbon should be removed by scraping and washing with kerosene oil and a stiff brush.

The valves are fastened in the engine block in the conventional way by pins and washers. They are accessible by the removal of the two valve stem cover plates which are located below the exhaust manifold. The valve springs may be lifted by means of a valve spring lifter, the pins taken out releasing the washers and springs and the valves removed one at a time for grinding. Before beginning the grinding operation, a piece of cotton cloth or waste attached to a piece of string should be tucked into the cylinder passage, while another piece of waste should be placed in the valve pocket to prevent the grinding compound entering the manifold.

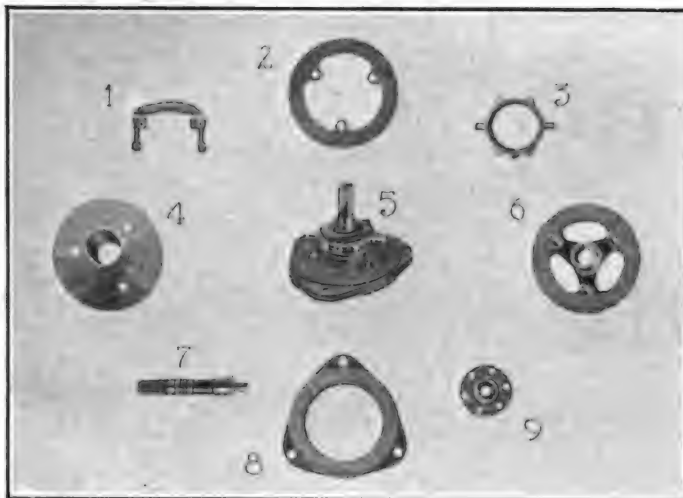
A careful examination of the valve guides should be made and where the fit between the valve stem and guide is poor, a repair should be made. In the earlier engines the guide formed a part of the block and was not fitted with a bushing. The Dodge Brothers sell valves with oversize stems which serve to compensate for the wear at this point. If, however, the guides are worn out of round, they should be reamed before being fitted with oversize valves. For this purpose the Dodge Brothers put out a special boring and reaming device, with which the guides may be reamed and bushed. When this is done the old valves may often be used, since the wear upon the stems is seldom great. In the later types of engines the valve guides are bushed and repair is made, simply by removing and replacing the bushings with new.

Magneto and Ignition.

After the wires leading to the motor-generator and magneto or coil have been tagged they should be disconnected. Both the magneto and Delco ignition systems are driven



Partial Cross Section of Engine. 1, Camshaft; 2, Intake Passage; 3, Valve Lifter; 4, Oil Pump Ball Check Valve; 5, Oil Pump.



• **Disc Clutch Components.** 1, Clutch Release Fork; 2, Driven Disc; 3, Clutch Release Collar; 4, Pressure Plate; 5, Clutch Disc Assembly; 6, Driven Spider; 7, Clutch Shaft; 8, Driving Disc; 9, Shaft Bearing Retainer (Front).

from the pump shaft and are driven through a flexible coupling. This coupling should be disassembled, the ignition unit unbolted from the base and then lifted from the car.

The fan belt adjustment is then loosened and the fan with the belt removed. The fan drive pulley is fastened to the shaft by a pin, and a key. The pin is driven out and the pulley pulled from the shaft with a wheel puller.

On the later cars the water pump drive gear is enclosed in a removable housing, while on the earlier cars, the timing gear housing together with the water pump gear housing was cast in one piece. Where the engine is fitted with a removable water pump housing, the next step in the disassembling is the removal of the water pump, while in the earlier types, the water pump should be left until the engine has been removed from the chassis.

Disconnect the water connection from the cylinder block by removing the nut which fastens the water fitting to the block, then remove the bolts which fasten the water pump to the crankcase. Next remove the water pump gear housing whereupon the pump with housing and gear attached may be taken from the engine.

The gear which drives the pump shaft is next pulled off and the water pump cover removed, exposing the water pump paddle. A careful cleaning should be given this unit. If the bushings which form the bearings are worn they may be replaced with new.

The motor-generator, which is driven by a chain and located on the left side of the engine, should next be removed. The clamp which fastens this unit to the engine should first be uncoupled and the chain inspection cover taken off. After the chain adjusting ring set screw has been loosened and the castellated binding nut on the starter removed, the eccentric adjusting ring may be turned so as to slacken the chain. With the chain slack, the master link may be uncoupled and the chain removed. The motor-generator may then be removed from the engine.

To obviate any chance for breakage, the oil filler and breather pipe should be unbolted and removed, and the button which is on the top of the oil level indicator taken off.

Letting Down the Engine.

The oil tube which is coupled to the oil pump and extends to the upper part of the crankcase on the outside front of the engine should next be disconnected at the pump, and, after the oil has drained from the system, the engine should be supported by a block and tackle, or by a bar passed through the carburetor intake passage and supported upon horses or boxes. The bolts which fasten the upper part of the crankcase to the gearset should then be loosened so as to allow about $\frac{1}{4}$ inch clearance. The bolts holding the oil pan to the bottom of the crankcase and gearset should then be removed and the engine slowly let down enough to permit the removal of the oil pan. This procedure is

necessary because there is a small flange on the gearset bell housing which under ordinary conditions keeps the rear of the pan from clearing the housing. After the pan has been removed, the upper crankcase-gearset bolts should be tightened again. This applies only to earlier models.

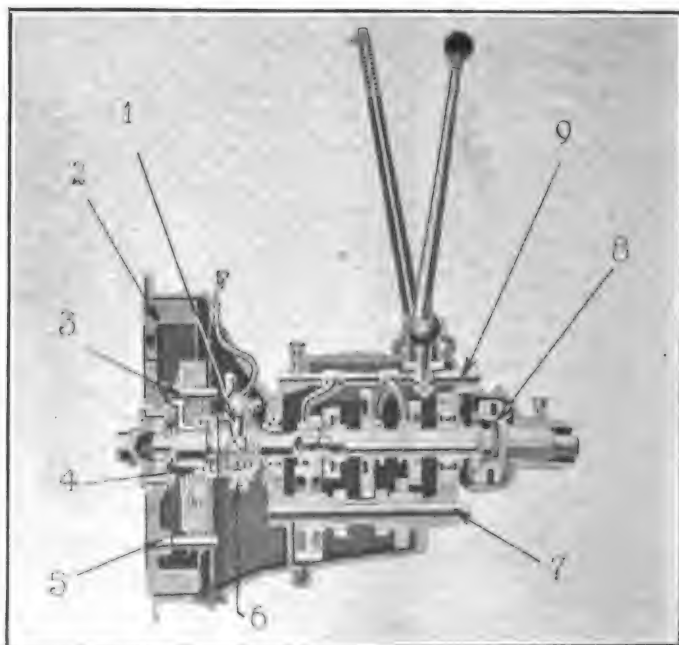
When the oil pan has been removed the oiling system will be exposed. The oil pump which is located near the front end of the pan consists of two vanes and an impeller mounted on a vertical shaft and driven by a set of spiral gears. After the oil tube which leads from the pump to the lower part of the case has been uncoupled and the two retaining screws removed, the pump body with shaft and gears attached may be taken off for examination. Since this is a most important part of the engine, the oiling system should be given a thorough cleaning. The oil strainer, which is mounted on a flange retained by two screws on the lower part of the case should be thoroughly washed or replaced if it is broken. The oil tube should be cleaned by means of a stiff wire and flushed with kerosene oil. All of the oil tubes, including the tube leading to the pressure indicator should be treated in a like manner.

In replacing the oil tubes, the joints may be made tight by an application of shellac. Shellac is also used upon the gaskets which fit between the oil pump body and the oil pan as well as between the oil strainer fitting and the oil pan. It is essential that all joints be tight, or the oiling system will not be efficient. When the oil pump is replaced the vanes should be placed with the spring between them, and so that the flat faces are in the direction of the rotation of the impeller.

The oil pan which is fitted with troughs into which the connecting rods dip should next be removed and the oil pan reservoir given a thorough cleaning.

All of the connecting rod bearings may be replaced without removing the connecting rods, since the babbitt is cast in two sections which are removable. If the engine is to be removed from the chassis, however, the weight is greatly lessened by the removal of the pistons and connecting rod assembly at this point. The wrist pins are fastened into the piston by a set screw and this end of the connecting rod is fitted with a removable bushing. In case of lost motion or play, it is always advisable to replace either the bushing or wrist pin or both, or a knock will be caused. When the wrist pin set screw is replaced, it should be pinned into place by a cotter pin, or damage to the engine will result.

Two methods of power plant removal are possible; the



Sectional View of Clutch and Gearset. 1, Clutch Release Fork; 2, Flywheel; 3, Driven Disc Pin; 4, Clutch Spring; 5, Driving Disc Pin; 6, Ball Bearing Clutch Release; 7, Countershaft; 8, Universal Joint; 9, Shifting Shaft.

engine may be removed by itself, or the engine and transmission gearset may be taken out at the same time. The first method is to be recommended as being the most practical for the novice, since the weight of the full power plant is much greater than that of the engine alone.

If the engine is to be removed by itself, it should be supported by block and tackle, or by a bar passed through the intake passage, as before directed. The bolts which fasten the crankcase to the transmission bell housing are next removed and the ball joint cover which retains the front engine member in the frame taken off.

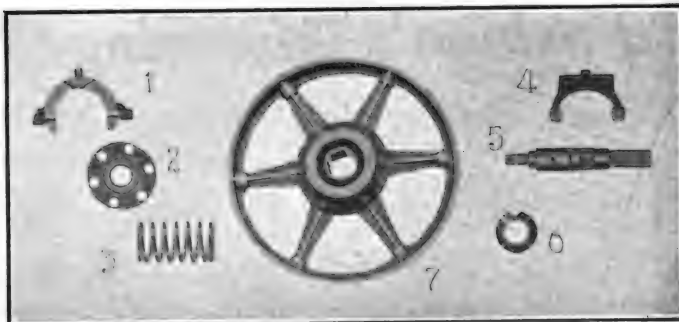
Two types of clutches have been used on the Dodge Brothers Car; The first 50,000 cars were equipped with a leather faced cone clutch, while the later ones were fitted with multiple disc clutches. In each type, the clutch shaft is carried in a ball bearing which is fitted and retained in the engine crankshaft.

In removing engines which are fitted with the cone type of clutch, it is necessary to remove the clutch with the engine, but before this can be done the set screws which fasten the clutch shift fork to the pedal shaft must be removed and the clutch pedal shaft withdrawn, this will release the fork which may be lifted from the gearset. The engine may then be lifted out as hereinafter directed.

In the disc type clutch, the wheel is fitted with three driving pins upon which are fitted the driving plates. When this type is being disassembled, the engine may be taken out without disturbing the clutch or shift fork.

Before removing the engine, however, the two bolts which fasten the bell housing to the frame must be taken out and the transmission slipped back slightly to allow clearance enough for the freeing of the engine in the front. The front is first lifted clear of the supporting member, then the engine is moved forward and up until it is free from the transmission gearset housing.

Where the full power plant is to be removed, the universal joint ball housing ring is unbolted and the top of the transmission gearset which carries the emergency brake and the speed change lever taken off. The brake rods and controls are then disconnected and the transmission gearset may be removed with the engine as above directed. When

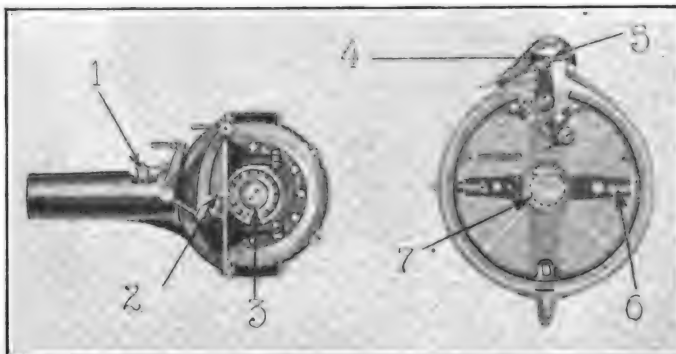


Cone Clutch Components. 1, Clutch Release Yoke; 2, Front Bearing Retainer; 3, Spring; 4, Fork; 5, Clutch Shaft; 6, Adjusting Collar; 7, Cone.

this has been done the gearset housing and clutch assembly may be removed from the engine in the same manner as directed for the removal of the engine alone. In lifting the complete power plant from the car, the engine should be supported by ropes passing around it, rather than by the method recommended for lifting out of the engine separately.

After the engine has been removed, if the clutch is of the

disc type, the removal of the flywheel which is retained to the crankcase flange by six bolts, is the next step. Where the clutch is of the cone type and has been removed with the engine the lock screw which is located on the clutch spring adjusting nut should be unscrewed and the nut backed off. It is a good plan to wind a piece of rope or cloth around the square end of the clutch shaft, just before the nut is ready to come off, and to unscrew the nut with a pipe wrench. The strong spring will force the nut off very quickly against the cloth, and one should be



Differential and Brake Arrangement. 1, Adjusting Ring Lock; 2, Differential Adjusting Ring Lock Screw; 3, Differential Adjusting Ring; 4, Locking Nuts; 5, Adjusting Yoke; 6, Brake Shoe Bottom Support; 7, Wheel Bearing Adjusting Nut.

careful not to have one's fingers in the way.

In returning the spring assembly, the spring should first be put into place, then the adjusting nut, and upon the nut a length of pipe. When pressure is brought to bear upon the pipe the spring is compressed and the nut may be turned into place, and locked.

After the clutch spring has been removed, the drum may be slipped from the shaft, exposing the flywheel assembly which is removed as directed above.

The next step in the disassembling is the removal of the timing gear case cover. When this is removed, the timing gears are exposed as well as the motor-generator driving sprocket. On the removal of this cover from the older cars, the pump gear may be taken off and the pump removed as directed earlier in this article.

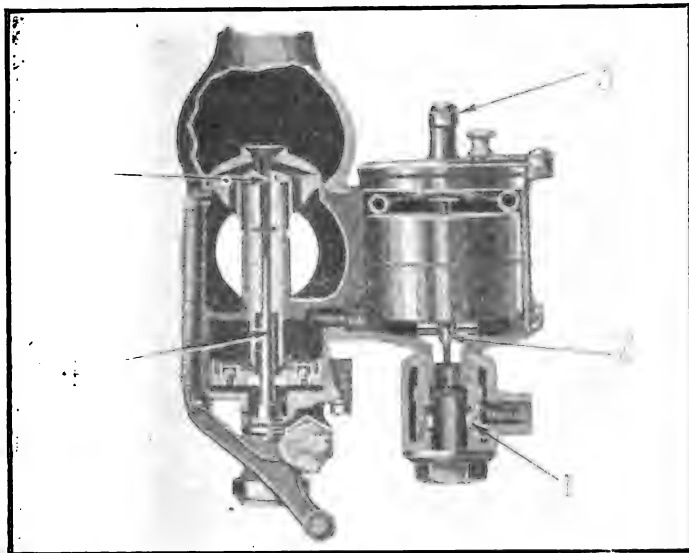
Unless the gears or sprockets are badly worn, they need not be removed from either the camshaft or crankshaft since the main bearing caps may be removed and the crankshaft taken out allowing the removal of the camshaft without disturbing the gears.

Taking Gears From Crankshaft.

To remove the gears from the crankshaft, the starting pin must first be driven out and the oil pump gear collar removed. The oil pump gear may then be pulled from the shaft with a wheel puller, as may also the starter chain sprocket. After the spacing collar has been removed from against the timing gear, this gear may also be pulled from the shaft with a wheel puller. In reassembling, care must be used to get the spacing collars back to their proper locations.

The camshaft timing gear is screwed to a flange which is integral with the camshaft. When the six cap screws have been removed, this gear may be taken from the shaft.

(Continued on Page 46.)



Cross Section of Carburetor. 1, Gasoline Filter Screen; 2, Needle Valve; 3, Needle Valve Cap; 4, Metering Pin; 5, Spray Nozzle.

Fashion's Motoring Trinity

Coats, Frocks, Hats — By Mrs. A. Sherman Hitchcock

MOTOR clothes, which a few years ago were considered a fad or extravagance, are today one of the established parts of fashion. Women realize the practical, and at the same time attractive, quality which these clothes possess. The development of motor raiment is greater each season and the designers and manufacturers are bringing forth a wide variety of garments to suit the individual taste and pocketbook of the wearer.

So great is the diversity of shapes in hats now shown by the milliners which are appropriate for motoring wear that each and every woman should certainly find something especially suited to her individual style. The new models are usually attractive and chic looking. There are the brimless turbans and the turbans with tiny, narrow, cloche brims. There are large flat hats with very flat trimmings for wear in the closed cars. There are soft crowned toques and the attractive Tam styles. There are Alpine hats and the new and popular Boy Scout model. The Chinese type, which is having much popularity, is practically a variation of the Breton sailor. In these shapes a double or a triple-tiered crown suggesting a Chinese pagoda is employed, and the brim, which stands away from the face, is either in two tiers or in deep scallops.

Military Shapes on the Wane.

The military influence is considerably lessened. The trench helmet, the visor front draped turban and the Russian cap, all of which were motor models, are



Whether she drives her car, or is content to go as a passenger, the motor woman needs warm, well-fitting gloves. Model showing front of glove, the Pirate; showing back of glove, the Spotif; so velvety they may easily be folded and stowed away in the pocket. Courtesy R. E. Bradford, Gloversville, N. Y.



For the Youthful Motorist comes this excellent coat of wool velour in green, brown, beetroot or navy blue with large collar of Nutria fur, which can be worn open at the neck, forming revers. With tailored cuffs, large patch pockets, lined and warmly interlined. Courtesy Franklin Simon & Co., N. Y. City.

now entirely replaced by the soft crown hat similar to the campaign hat of the American soldiers. While these hats have, of course, a wider brim they are of so soft and lovely a quality that they are not at all heavy and a band of velvet placed inside of the crown makes them cling closely to the head so that it requires a very hard gust of wind to dislodge them. There are some very attractive Boy Scout hats in silk plush with no other trimming than a band of gros grain ribbon and flat pump bow directly at the front.

Trimnings of Newer Modes.

The newest cloche shaped motor hats are usually made of colored velvet and are trimmed with miniature flowers on the order of forget-me-nots, and small light colored velvet apples with leaves in black leather. A smart model is of burgundy Roshanara Crepe trimmed with a band of closely massed forget-me-nots in the same shade. Roshanara Crepe is ideal as a millinery material. The use of hand-made shanes with handwork such as shirrings, fluting, and smocking continues decidedly modish and the woman who is handy with her needle and possesses more or less artistic taste may very easily create for herself a chic motor hat of this lovely material. Very little ornamentation is employed; one of the little feather fantasies or a bead motif are really all that is necessary. Many times they are simply trimmed

with a wide self band stretched snugly around the crown.

Many Knitted Whimsies.

One of the particular whims of fashion's motor mood this season is knitted cap and scarf sets. They are warm, comfortable and attractive. Made in a great variety of grades and patterns, in fleeced and angora effect, as well as plain, of silk, wool, worsted, and cotton and in all the fashionable shades, they are both novel and modish.

The little maid is provided with motoring attire nowadays quite like older folk. The most comfortable coats of wool, fur trimmed, are warmly interlined, and are most protective. There are comfortable fur coats of squirrel and raccoon and caracul which are built so roomy that they slip on easily over the



Motoring Coats such as this, of green wool velour with convertible collar, muff cuffs, and wide border of lapin fur, fortell the direction of the mode. It is gathered at the waist line, belted, has inset pockets, is silk lined and warmly interlined. Courtesy Franklin Simon & Co., N. Y. City.

party frock for the ride to and from dancing class or party. There are dear little bonnets of white fur for hiding away pink ears from Jack Frost. The same white fur is used as collar and cuffs of the coat. Sometimes the whole coat, as well as the bonnet, is of the white fur, giving one the impression of a very bright-eyed little bunny.

Garments for the Little Maid.

One of the very new and popular garments for the little motorist is a one-piece cape and hood which is called the Red Riding Hood. This is in very charming shades of red and has a most

lovely lining of printed Pussy Willow which also shows in the lining of the hood. Another lining used with charming effect, both in capes for the youthful motorists as well as the grown-ups, is the new Will-O-The-Wisp, a filmy fabric with a gossamer-like weave which shades so mysteriously that one is kept guessing as to just what color it really is. Despite its fragile appearance it possesses the wearing qualities of iron. Severe tests have been given it which have proven its right to rank with materials which must stand hard wear.

Glove manufacturers are meeting the requirements of the woman motorist with wonderful results. Gloves are a very important item of present day motor fashions. Two of the best of the season are herewith illustrated, the Pirate



This Motor Cap and Scarf Set is among the popular motoring accessories that are in great demand. Everyone wears knit goods nowadays, obtaining great comfort, thorough protection, and nothing could be more attractive. Courtesy Standard Knitting Co., Cleveland, O.

this year than they have been before, and they are fur trimmed, warmly interlined, and have exquisite linings of silk. Their collars are of the most wily kind—worn high they are like a voluminous fur neckpiece, worn low they make the coat seem to be nearly all fur. The furs popularly used on motor coats include taupe wolf, silver wolf, gray lynx, skunk, kolinsky, flying squirrel, silver rabbit, Australian opossum, racoon and muskrat. A few mixtures in wool materials are seen but plain colors have a most decided preference. The taupe shades are by far the most popular, while dark green, seal brown and the brighter shades of blue are in good style. Buckles, large buttons and tassels are the modish trimmings, and although belts have been in vogue for some time, they still appear in various forms on nearly all the new coats.

Comfortable, Stylish Motorobes.

An ideal covering for the occupant of the motor car is one of the new Stroock Motorobes. A motor robe, to be absolutely desirable and practical, must be smart looking, sturdy, and above all, a protection from the elements. There is a robe for every occasion—for every type of car, every service, and every size of pocketbook, with harmony of coloring and patterns to match any motor car upholstery and trimmings. They range from the heavy double motorobes interlined with rubber and with muffs or pockets for the coldest kind of weather in the open car, to those for the town car as soft and flexible as a kitten's ear and in the loveliest of solid and two-tone colorings. They are of plush construction, and the wear, coming on the end of the fibers instead of the body of the robe, assures long wear under all conditions. There are several different sizes.

I cannot imagine anything more ideal or welcome for a holiday gift than one

of these exceptional robes. The Prince of Wales is a crush-plush, shaded, pattern-faced robe, with plain back. Prince Charming is in solid color in heavy crush plush. The Polar is a leopard-skin effect on plush and is rubber interlined. The Peerless is a large black and white pattern on mohair plush. My own particular favorite is the lovely Princess, in a most delectable shaded effect ranging from a rich brown to a creamy tint. The Princess is a very high grade crushed-plush face, with wavy mohair back of plush and is a most fitting companion to the occupant of the sedan or limousine.

Foot Muffs and Heat Bottles.

The foot muff of French civit, lined with bear pelt, is gloriously warm and comfortable during the rides in cold weather, and especially so when one is going to some festive occasion and is wearing light shoes or slippers. Another article of great value to the motorist who drives the year round, is the Cello metal hot water bottle. This practical article will retain the heat for a long period of time and render a very appreciable service in many cases. On Autumn tours through the mountains, articles of this character are an almost necessity, and more especially if any of the party are not physically strong and are easily affected by weather conditions. I personally know of motor women who carry two Cello bottles along in the car the year round and consider them as necessary equipment as anything else.



Hudson Seal Motorist's Fur Coat, trimmed with large collar and muff cuffs of skunk. The beautiful lining—and linings are very important this year—is of pussy willow silk in brown, with the most wonderful natural rose in self color. Posed by Elisabeth Ridsen, star of "The Manxman."

and the Sportif. The Sportif is made of a beautiful quality of tan kid, with strap and a double weight knit lining with close fitting wrist. The glove and the lining are separate and can easily be washed and dried at home. The Pirate comes in tan, grey and black. It may be had unlined, with heavy wool lining or lined full length with lamb's wool. The strap, instead of being put on the palm as usual, is put at the back which gives an original and smart effect. The gauntlet cuffs are very soft and the gloves can be rolled up and carried in the coat pocket when not in use.

Motoring coats are more elaborate



Motor Frock of Betty Wales Design in navy, brown or Burgundy serge, trimmed with rows of soutache braid and bone buttons. Courtesy Franklin Simon & Co., N. Y. City.



Driving A New Car to Death



WILL FIXIT usually has an idea for a story when I drop in to see him and yesterday was no exception. "If you are a member of the Society for the Suppression of Cruelty to Automobiles you will realize how I feel when I say that my ire is aroused against some of the present day car abusers," said William, as I took my seat on a convenient box.

"Take a perfectly new and good car and put it into one of those same 'maniacs' hands and he will drive it to death within a month if he lives that long himself. Tommy Harrington is just one of that sort and he keeps me worried to death most of the time, not for his neck, but for my reputation.

"I suppose you wonder just what I mean by this statement? Well, let me tell you. Tommy is a good boy, truthful, and everyone is his friend, but he is the most reckless fellow with an automobile that I ever saw. He knows machinery from A to Z, but has absolutely no respect for his own automobiles.

"I have seen him take an automobile that was ready for the scrap heap, work on it for about a month and then win a 'free-for-all' contest. For automobile knowledge he has a greater reputation than I, even if I am a repair man, and I guess he deserves it.

"In the past six years Tommy has owned eight different makes of machines, and it is interesting to note that not one of the eight makes of cars is popular in this village. Tommy's opinion is so regarded that the prospective car buyer is

very apt to be led by Tommy's judgment.

"Tommy expects too much of his cars and when the car fails then he condemns the machine. That's just what I am afraid of now. He is looking at one of my cars and I am afraid that he will buy it. As soon as the car falls down, bang goes my agency in the town. I won't be able to give a car away, much less sell one.

"I only wish that the people realized that nearly all of the present day cars are good in every sense of the word. One car may have one or two little selling points that the agent can enlarge upon, but at the same time another will have many balancing features.

"Every automobile manufacturer stakes his reputation upon his car. He isn't going to market a machine that he knows is mechanically weak. Before he puts the car on the market his whole staff of engineers go over every part, check over bearing and shaft sizes, test the material and decide upon the best design.

"Of course I think that the car I am selling is the 'best,' because I have looked up all of its good points, but I don't doubt that I could find another car just as good if I cared to. It is just such people as Tommy that keep the prospective customers 'on the bench' so to speak. The average person knows so little about a car that he is afraid to buy one because of the possibilities of great expense and the chances of getting a poor car.

"It usually takes about a year to convince this kind of person that he is mis-

ing a great deal of happiness in depriving himself of an automobile. Should a 'Tommy Harrington' talk with him chances are that he will hesitate even longer. Our only hope is to close with him first and save him much trouble and worry."

Automobiles Exempt From Export License.

The Exports Administrative Board of the government has issued a list of articles which do not require an export license at present except when shipped to Albania, Austria-Hungary, that portion of Belgium occupied by the military forces of Germany, Bulgaria, Denmark, her colonies, possessions, or protectorates; Germany, her colonies, possessions or protectorates; Greece, Leichtenstein, Luxembourg, the Kingdom of the Netherlands, Norway, Spain, her colonies, possessions, or protectorates; Sweden, Switzerland, or Turkey (excluding any portion of the foregoing occupied by the military forces of the United States, of the Nations associated with the United States in the war), or any territory occupied by the military forces of Germany or her allies.

Automobiles and parts are included in this list and specific mention is also made of the following articles used by motorists: ball bearings, jacks, lamps, metal valves, radiators, rubber, rubber cement, screws, screw drivers, speedometers, spark plugs, spokes, sprockets, trailers, trucks, ratchets, and wrenches.

States in License Race.

The states of Ohio, California and Iowa are running a close race in the number of automobile licenses issued to date, standing recently in the order named with 320,000, 268,096 and 262,772 respectively. Ohio has already issued more licenses than for the entire year of 1916, when only 247,807 gasoline cars were licensed. California issued 250,660 licenses in 1916. Iowa has a motor car for every ten persons of its population.

Convicts on Missouri Roads.

The State of Missouri is making arrangements under which the various counties will employ convicts on highway construction. Convicts will work under the direct supervision of the state highway department and the counties will pay the state for their work a sum not exceeding \$1.50 a day per man including the food, lodging and guarding.

FOOD PLEDGE

(From The Automobile Journal.)

TO THE UNITED STATES FOOD ADMINISTRATION, WASHINGTON, D. C.

I am glad to join you in the service of food conservation for our nation, and I hereby accept membership in the United States Food Administration, pledging myself to carry out the directions and advice of the Food Administrator in my home, in so far as my circumstances permit.

Name.....
Street..... City.....
State..... Occupation.....
Number in household..... Occupation of breadwinner.....
Will you take part in authorized neighborhood movements for food conservation?.....

Have you a garden?.....
There are no fees or dues to be paid. The Food Administration wishes to have as members all of those actually handling food in the home. All women over 16 are eligible.

DIRECTIONS.

Cut this out and mail it as your pledge card to the Food Administrator, Washington, D. C., and you will receive free your first instructions and a household tag to be hung in your window.

If you want the button of the Food Administration, send 10 cents and a return addressed envelope. The shield insignia for the sleeve of the uniform will be sent with the button if you ask for it.

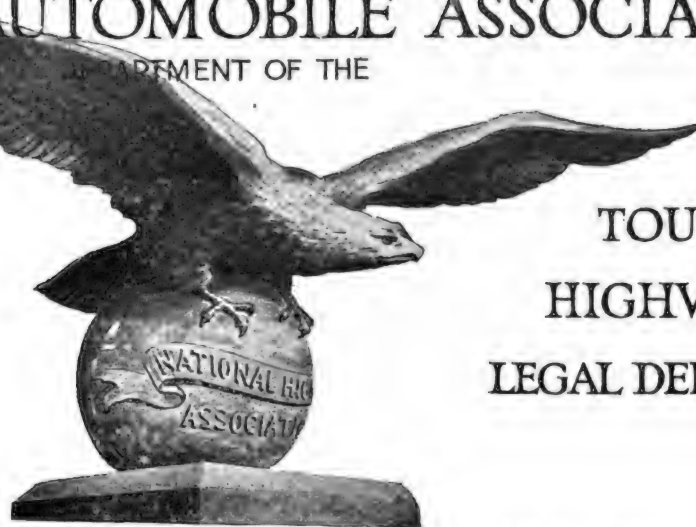
(Remember Food Pledge Week, Beginning Oct. 21.)

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Suggesting Wider New England Reciprocity

WE recently had occasion to note, and with pleasure, that the Commissioner of Motor Vehicles of Connecticut contemplated entering into reciprocal agreements with the authorities of other New England States for the purpose of properly handling drunken, reckless and indifferent drivers of automobiles upon the highways. This is an excellent attempt to rid the highways of a class of users who are not only a menace to other users but to themselves as well. Reciprocity having been deemed a good political and commercial expedient before, there is no good reason whatever why reciprocal arrangements between the States in dealing with motor vehicles and their operators might not also develop into a splendid and beneficent system, if not for the whole country at least for New England.

But why stop at the proper handling of drunken or reckless operators? Why not go further? Why not arrange for reciprocal benefits as well as for reciprocal punishments? New England is but a small place, geographically speaking. Motorists may traverse the highways of all six of the New England States in a single day. In this single day they may also be subject to the statute laws of these half dozen states as well as to the local regulations of scores of cities and towns. The motor car owner and the motor car operator, eliminating for the moment the enormous commercial and other aspects of the business, are entitled to some consideration beyond the exaction of fees and taxes and the meting out of punishments. We therefore suggest a few improvements that might be brought about in the near future through reciprocity or through the committee of the New Eng-

AUTOMOBILE HEADLIGHTS.

The Head light laws of the New England and adjacent States are causing so much commotion in the motor world that we deem it advisable to send out a general warning to motorists at once to equip the head lights on their automobiles with some approved dimming device, or to be-dim their head lights by some other means at least to some degree.

The law of New York, Connecticut, Massachusetts, Maine and other States upon the subject substantially provides that lights shall be so adjusted as to prevent dazzling rays and that rays shall be thrown upon the road-way directly ahead of the automobile instead of illuminating the surrounding country as was heretofore the vogue.

land States officials that would prove a great boon to the three hundred thousand and motorists of New England.

First—A uniform traffic law, simple, concise, and sensible, for the cities and towns of each New England State.

Second—A New England registration tag or identification plate.

Third—A New England chauffeurs' and operators' license.

Fourth—A uniform signboard for all New England state highways as well as for all cities and towns.

Fifth—A uniform marking of routes by colored bands upon posts, fences, trees, etc., such as is found now, in a more or less uniform degree, in Massachusetts,

New Hampshire, Connecticut, and Rhode Island.

The enactment of laws which would put into operation these five things would be a wonderful improvement over the present method of regulating motor vehicles and their operators in the New England States and might ultimately lead to their adoption by all the States of the Union.

Detroit Don'ts.

The Detroit Automobile Club advises us as follows:

Avoid Loss by Theft.—Bagley Avenue and Woodward and cross streets near the Majestic Theatre are two of the best places in town to have cars, tires and accessories stolen. If you would have your property safe at the theatre, park your car in a conspicuous spot. Avoid Bagley Avenue.

Get New License.—If you should happen to buy a used car, be sure to go to the Secretary of State's office and purchase a new license. The law now provides a penalty for those who use a license issued in another's name.

Watch Your Tail Light.—Numerous motorists have been observed of late driving with tail lights out. There is a penalty provided in the traffic ordinance for this. Be careful. You may be summoned into court. Think of the tail light, too, as a preventive of roadway collisions.

Give these the Go-By.—Ypsilanti, Albion and Marshall are operating speed traps. In going to Battle Creek or any other cities along Michigan Avenue, avoid these towns.

LATE DECISIONS IN MOTOR LAW

Insurance Company Must Pay for Depreciation of Automobiles Is a Ruling in Minnesota

IN a recent case before the Minnesota Supreme Court it appeared that there was a clause in the insurance policy covering the plaintiff's car which provided that "the company's liability is limited to the actual intrinsic value of the property damaged or destroyed at the time of its damage or destruction, which shall not be greater than the actual cost of the repair or replacement thereof."

The plaintiff's automobile collided with a car belonging to one, B, and damaged it, under circumstances which rendered the plaintiff liable. The defendant paid the owner of the damaged car the amount of the bill for repairs paid by him. Thereafter B recovered a judgment against the plaintiff for the depreciation in the value of the car caused by the accident over and above the amount paid for repairs. The plaintiff paid this judgment, and brought an action against the insurance company to recover the amount paid B; plus attorney's fees, from the defendant company under the policy.

The question before the court was whether the limitations clause above quoted did not limit the liability of the defendant to the actual cost of the repairs made, when it appeared that the repairs did not and could not make the car as good as it was before the accident; and also whether the plaintiff could not recover the amount of the judgment paid by him for depreciation in the value of the car, with attorney's fees incurred in defending the suit, whether the amount involved was small or not.

Counsel for the plaintiff argued that the policy promised indemnity from liability imposed by law upon the assured for the destruction of or injury to the property of others. And that the limitation clause should be construed liberally so as not to defeat recovery for liability imposed by law for injury to the property of others. It was clear that B's car was injured over and above the cost of the repairs made. It was also clear that the injury could not be remedied by repairs, and it was also clear that the law imposed liability on the plaintiff for injury to B's property. The court said that but for the limitation clause there would be no doubt of the liability of the insurer. Was it intended, the court added, that the limitation clause preclude liability when the insured was compelled to pay for injuries that could not be remedied by mechanical repairs? Is this clause so free from ambiguity that it is necessary so to construe it? To repair an automobile means to restore it to as sound or good state after injury or partial destruction, to restore it to its original condition. "Replacement has much the same meaning; but

as used would seem to refer to cases where property is destroyed rather than merely damaged, where repairs only will not restore it to its original condition. But there are many articles of property which are never again of the same value after injury and repair. It would often be impossible to restore a damaged article to its original condition by repairing it. It was not possible to make B's car as good as it was before it was damaged. Yet all was done that was possible to this end without buying him a new car. The court, (or rather a majority of it), were of opinion that the clause providing that the liability of the insurer was limited to the actual value of the property damaged or destroyed; "which shall not be greater than the actual cost of repair or replacement thereof," was too narrow a construction of the language of the limitation clause; that there are damages to property that are not and cannot be fully remedied by repairing them, and that there is a liability for the full loss, limited, of course, by money limit specified.

Held that judgment should be entered for the plaintiff for the amount claimed.

Settlement Contract Terminating Policy Rights.

An automobile became disabled on a highway in the State of New York and the next day the automobile was burned. An action was brought by the owner on a policy of insurance to recover for the loss resulting therefrom. Upon a trial of the action the complaint was dismissed at the close of the case. Upon appeal from the judgment entered thereon the Appellate Division reversed the judgment and granted a new trial. From such order and judgment the defendant appealed to the Court of Appeals.

It appeared to the Court of Appeals that the plaintiff's automobile, insured by the defendant for \$2,500, was burned, and that the plaintiff filed a claim for total loss, which the defendant disputed. The defendant company then offered to settle the claim for \$2,000, or to ship the car away for repairs. The plaintiff elected to accept the proposition for repairs, stating that the defendant must make the car as good as before the fire, and not to delay too long. The defendant then wrote plaintiff that it had made arrangements to ship the car away and would require about four weeks to make the repairs.

And the Court held that a settlement contract arose, terminating all rights under the policy contract; so that the only remedy thereafter was for a breach of the new contract.

POLICE ACTIVITIES IN NEW ENGLAND.

During the fall touring the police authorities of the New England States seem to be dominated by a penchant to rigidly enforce the motor vehicle laws and traffic regulations. This is not an impromptu effort, but a regular fall harvesting. Therefore, we deem it advisable to call tourists attention to the fact that traps have been operated in the following named localities during the present motoring season and are likely to be during the next two months, as a reminder to the motorists that the police are still "on the job."

Massachusetts.

Boston—Metropolitan Parks and Parkways, Beacon Street from Arlington to Massachusetts Avenue, Columbus Avenue from Massachusetts Avenue to Roxbury Crossing, Massachusetts Avenue in the vicinity of the Edison Buildings, Tremont Street from Park to Boylston Streets, Park Square and vicinity.

East Boston—Saratoga Street, near Austin; at Brooks and Chelsea Streets.

Besides operating traps in the above named places the police are making many arrests for leaving cars in the streets unattended beyond the time allowed by the traffic regulations of Boston, and for not sounding horns at corners and intersecting ways.

Cambridge—On Massachusetts Avenue, in the vicinity of Harvard Square; also on Massachusetts Avenue at Prospect Street; and on Brattle Street and Magazine Street.

Springfield—The entire length of the Main Street.

Worcester—Shrewsbury Street.

Arlington—On Massachusetts Avenue from the Soldiers' Monument to Arlington Heights.

Nahant—On the State Highway between Lynn and Nahant.

Northboro—On the main State Highway running through Northboro to Worcester.

Westboro, Concord, Blackstone, Southbridge and Concord.

Brockton—On Main Street, West Elm Street and Warren Avenue.

Assonet, In Fall River, Reading, on the Andover Turnpike, Ipswich, Norwood, near the Norfolk Hospital, South Hadley, Sandwich, Quincy and Plymouth.

The laws prohibiting dazzling headlights on automobiles and the approach of motor vehicles nearer than eight feet to a street car stopped to take on or let off passengers is being rigidly enforced throughout the Commonwealth.

New Hampshire.

Concord, Keene, Laconia.

Manchester—On the boulevard from Manchester to Massebec Lake. And on the Hanover Street Boulevard and Candia Road.

Merrimac.

Nashua.

Somersworth.

Rhode Island.

Providence.

East Providence.

Pawtucket—On West Avenue, Mineral Spring Avenue and Broad Street; Main Street, after passing square, also on Broadway.

Woonsocket.

Riverside—In Pawtucket Avenue and on Bullock's Point.

Newport.

Cumberland—On Broad Street.

Wakefield, Peace Dale, and South Kingston.

Westerly.

Narragansett Pier.

Maine.

Between Biddeford and Portland.

Portland—In entering the city on the main road from Boston.

Dexter, Auburn, South Portland, Gray, Scarborough.

And between Portland and Poland Springs, near Dry Mills and Rockland.

Connecticut.

Hartford and East Hartford—Especially on Farmington Avenue, Hartford.

North Haven and Wallingford, and between North Haven and Meriden.

New London.

New Haven—between Howard and Kimberly Avenues.

Stamford, Willimantic.

In Massachusetts.

East Boston—The police of the city are continuing to arrest motorists for overspeeding and for not slowing down and not blowing their horns at Brooks and Chelsea Streets and on Saratoga Street, near Austin Street; and little or no leniency is shown to offenders.

Boston—A new ruling by the Metropolitan Park Commissioners provides that an officer is not required to ask a motorist for his license unless he is to be summoned into court or arrested on another charge. The Commissioners direct that the person is not to be arrested but summoned into court.

Cambridge—Police officers stationed at Massachusetts Avenue and Prospect Street are haling into court motorists who fail to act at his signal.

Brookfield—Complaint still persists against overspeeding motorists on Central Street in this town.

In New Hampshire.

Somersworth—Motorists overspeeding through this town are being prosecuted. In some instances overspeeders are charged with recklessly operating.

Keene—The State Motor Vehicle Dept. is taking a hand in the prosecution of overspeeding motorists. Drivers have been haled into court not only for overspeeding in the built-up sections of cities and towns but also for exceeding the 25 mile limit in the open country.

Authority of Drivers of Trucks.

The driver of a truck used by a mercantile company in deliveries of its goods invited a lady acquaintance to ride on the step on the car, and in the course of the ride she was injured. The driver had no authority to invite persons to ride on the truck. The Court held the driver was not acting within the scope of his judgment; master not liable.

SOME SOUTHWARD MOTOR TOURS

From New England Shore Across Long Island— and Then Through Princeton into Philadelphia

These are the days when the motorist hies himself southward, and it is possible, therefore, that autoists may find a suggestion of value in some one of the four following motor tours.

New London to New York City via Greenport and Port Jefferson. 105 Miles.

Fair gravel roads and good macadam. Take steamer at foot of State St. to cross Long Island Sound to Greenport.

0.0 **GREENPORT.** Through Main and Front Sts., over Hashamonuck Pond, into

4.9 **SOUTHOLD.** Continue straight ahead through Peconic (8.1M) Cutchogue (9.9M), Mattituck (12.9M) taking left fork and over RR., passing Laurel P. O. (15.4M) through Aquebogue, passing Jamesport P. O. on left, into Main St., into

22.4 **RIVERHEAD.** Through Main St., passing fountain and over RR., bearing right, at 24.9M, thence into

33.2 **WADING RIVER.** Through town, and bear left around over RR., twice into and through Miller Place (41.9M). Continue through town, bearing left into Main St., into

46.6 **PORT JEFFERSON.** Through Jones St., bear left, into Broadway, and along the harbor and up winding grade, into East Setauket (48.4M). One mile beyond at 4-corners, left, passing Stony Brook Depot, into

51.9 **STONY BROOK.** Bear left and through town, right, upgrade, and 1½ Miles beyond take left fork through St. James (54.2M), over RR., bearing right, and over bridge into Smithtown (57.9M). Left under RR., then straight into Commack (62.5M), through town, turning right at 4-corners, into

66.4 **NORTHPORT.** Cross RR., passing Larkfield P. O., joining trolley and bearing left, skirting Northport Bay, bear right, then left, through Centreport (69.6M), through Main St, into

72.9 **HUNTINGTON.** Continue through town, through West Main St., and at fork ½ mile beyond bear left, passing Cold Spring P. O. on right, over concrete bridge, passing Fish Commission Station, bearing upgrade, into

79.9 **EAST NORWICH.** Continue through town, and 5 miles beyond, bear right over RR., through winding road, into

86.5 **ROSLYN.** Beyond Inn, right, meet and follow trolley, then left, through Manhasset Hills, (89.9M)

and at road's end, left, and bear left through Little Neck, (92.0M), bear left and over Alley Creek, through

94.0 **BAYSIDE.** Bear right over RR., through Broadway, into

97.5 **FLUSHING.** Through Main St., meet trolley, over bridge over Flushing Creek, straight ahead for about one mile, and bear left into "Shell Road." Through Corona, (99.4M) crossing Junction Ave. trolley and Broadway trolley, through Winfield on Thomson Ave., over RR. viaduct, into Jackson Ave., to Queensboro Bridge, into

103.7 **LONG ISLAND CITY.** Over Queensboro Bridge, into

105.0 **NEW YORK CITY.**

New York to Philadelphia via Princeton and Trenton. 117.5 Miles.

0.0 **NEW YORK.** West 42nd St. to Weehawken Ferry; leaving ferry boat left and right up grade into Boulevard, right into 3rd St., over Bergen Line Ave. trolley, at the end of the road, near cemetery, left into Hudson County Boulevard, over trolley into

6.4 **JERSEY CITY.** Right into parkway, through West Side Park, and at road's end, left meeting trolley, bearing right on Communipaw Ave., over bridge, over Hackensack into Plank Road, following trolley over Passaic River, under RR. and following trolley over RR., through fork, bearing left into Ferry St., under RR., into Polk St., right into LaFayette St., under RR. into

12.0 **NEWARK, N. J.** Through Broad St. and LaFayette St., following trolley into Broad St., bearing right into Clinton Ave., into Astor St., into Frelinghuysen Ave., over and under RR.'s, bearing left into Newark Ave., near Waverly Park Depot, into

17.0 **ELIZABETH.** Through No. Broad St., into Westfield Ave., over trolley, bearing left into Cherry St., over RR. bridge, and at end of the road, right, into Rahway Ave., over RR., through St. Georges Ave. into

22.7 **RAHWAY.** Straight ahead through the village, passing on the left, the Colonial Club House and at the end of the road, right, then, left, taking the left-hand road, passing Iselin Depot, right, passing Menlo Park Depot, and at end of the road, right, under RR., then left, into



- 30.0 METUCHEN. Through Main St. into Middlesex Ave., under RR. Bridge, then right, meeting trolley, over bridge, over Raritan River, through Albany St., into
- 35.5 NEW BRUNSWICK. Through Albany St. into George St., following trolley, left, into French st. and over RR., through Franklin Park, taking left hand road at 44.6, then left, into
- 48.5 KINGSTON. Straight ahead and over RR. and Canal, over River, and at fork, left, past Carnegie Lake on the left through Nassau St., into
- 51.5 PRINCETON. Pass College Bldgs. on the left, straight ahead over bridge, through Lawrenceville, 56.5 through Brunswick Ave., passing Soldiers' Monument, bearing left into Broad St., over RR., into
- 82.5 TRENTON. Through State and Broad Sts., west through State St., passing Capitol on left through 4 corners, left with trolley into Calhoun St., over bridge, over Delaware River, and at end of road, left, over RR. bridge, taking the right fork, through 4 corners, bearing right through
- 89.3 OXFORD VALLEY. Over RR. at Glen Lake Depot, into
- 91.9 LANGHORNE. Straight ahead through Maple Ave., and at 4 corners bear left and over RR. bridge at Janney Depot, bearing right through covered bridge, through La-Trappe into Bustleton Ave., into
- 101.4 BUSTLETON. At fork bear right into Castor Road, and at 4 corners, right, through Rhawn St., over RR. bridge and over tracks at Fox Chase Depot, into
- 105.5 TOLLGATE. At fork bear left, then right through Jenkintown Pike, bearing left into Meeting House Road, and at end of road left through Old York Road, into
- 108.6 OGONTZ. Through 4 corners, bearing right with trolley, and under RR., through Spring Ave.,

New Revere Beach Boulevard

The thousands of Massachusetts and foreign motorists who have in the past had occasion to travel along the North Shore, will be pleased to learn that the last link in the Revere Highway diverting motor traffic from the Beach Boulevard was open on September 22nd to general public use. This link cost the State of Massachusetts about \$500,000 and completes the highway that has already cost the commonwealth a full half million dollars. This highway will now attract the major portion of the heavy motor traffic plying between Boston and North Shore; and in convenience and in the saving of the wear and tear of motor vehicles it will prove a great boom to motorists.

This new highway begins at the south-

erly end at Revere Beach Parkway near Winthrop Avenue. It includes Winthrop Avenue, which has been widened to 80 feet, and cuts across a piece of private line near Centennial Avenue to Otis Street, which has also been widened. Across Beach Street, which is the principal approach to Revere Beach for the trolleys, the new highway extends over a new location, which is in part across the old Wonderland Park and near the Boston, Revere Beach and Lynn RR. tracks to Waban Street. Waban Street is opposite the end of the part of the traffic road, completed earlier, and which extends to the Point of Pines. The surface of the road is 32 feet in width and of bituminous macadam as to material used in its composition.

through 5 corners, bearing right into No. Broad St., under RR., bearing right, around circle and under RR., at No. Philadelphia Depot, into

117.5 PHILADELPHIA.

Some "Safety First" Rules.

Steering Gear.—More real damage may result from a defective or failing steering gear than from almost any other cause. A ruderless ship is a faint comparison. Therefore, every motorist should at least once a week inspect the steering apparatus, the bolts, nuts, pins, washers, etc. Looseness should be corrected at once.

Brakes.—Before you start to drive your car try your brakes—both foot and emergency. Observe whether your car stops in the usual distance, whether it swings to one side, for one wheel may be dragging while the other is moving freely. Failure of both rear wheels to move freely means damage to tires, and other unnecessary wear and tear.

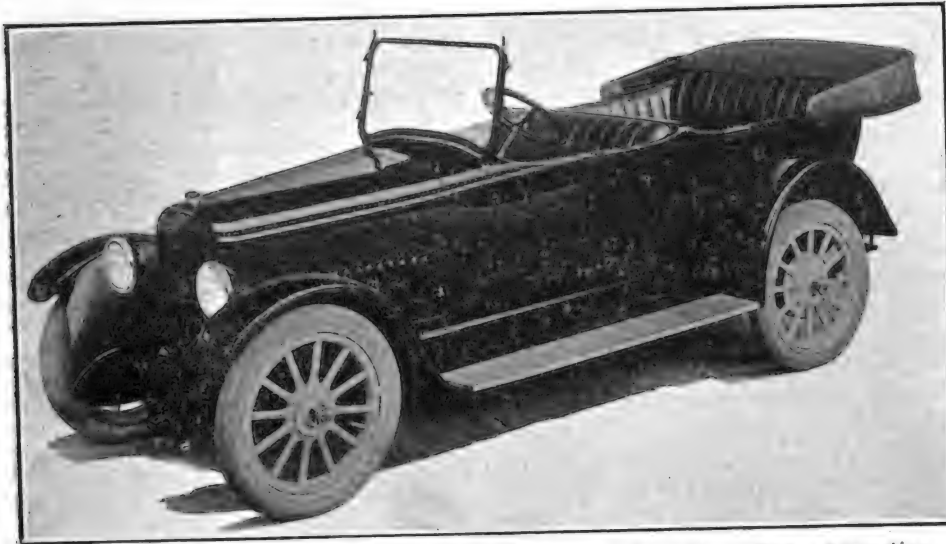
Skidding.—Avoid skidding if possible. Skidding will occur on wet or dry ways.

A watering cart, rains, snow each may produce a condition where chains should be used. Nonskid tires on rear wheels will also be found serviceable. When the non-skid devices are worn off use these tires on the forward wheels, replacing them with non-skids. Therefore, one should exercise every precaution.

In snow and rainy weather season a chain on each wheel is the safest precaution, when two chains are used they should be on the rear wheels; when one is used it should be placed on the left rear to prevent its being damaged against the curb. The chains should be fastened not too tightly, but so as to permit them to creep.

Lights on Cars.

The Supreme Court of North Dakota has held in a recent case that non-compliance with the statutory requirement that automobiles should be supplied with two lights on the front of the car does not, as a matter of law, amount to contributory negligence on the part of a guest riding in the car where there is only one lamp on the front of the car properly lighted.



Nash Six Cylinder Five Passenger Touring Car, With Low Hung Body, Attractive Lines and 121 Wheelbase.

More Deaths by Automobiles.

The National Highways Protective Society reports a marked increase in the number of persons killed in the highways of New York State by automobiles during the nine months ending September 30. In that period 636 persons were killed as compared with 543 and 476 for the same periods of 1916 and 1915 respectively. In New York City automobiles caused the death of 46 persons during September.

New Olds House Organ.

"The Oldsmobile Pacemaker," the new monthly house organ of the Olds Motor Works, Lansing, Mich., made its initial appearance with the October number. It is a very interesting book and well illustrated. Under the heading "Oldsmobile Outlook," the editor comments on the prospects of the year as follows:

"Progress, expansion, leadership, belief in themselves, and in their product are the basic ideals upon which the Oldsmobile has been so successfully reared.

"It so happens that as the company enters upon the third decade of its career, this great country of which it is a part is at war with a most determined adversary. Yet, even in the face of this, and that like every other loyal business establishment it has lost numbers of workers by enlistment and the selec-

tive draft, the Olds Motor Works is proceeding with a bigger expansion program than it ever before undertook to carryout."

Nash Six Specifications.

Engine	Nash
Cylinders.....	Six, cast in block
Bore and stroke.....	3¼x5
Valves.....	In the head
Horsepower (S. A. E.).....	25.3
Ignition.....	Delco
Starting-Lighting.....	Delco
Clutch.....	Dry plate
Gearset	Three-speed
Wheelbase.....	121 and 127 inches
Wheels	Wood
Tires	34x4
Prices: Touring, \$1,295; Spring-field Sedan, \$1,985	

Denver Exhibition.

The Automobile Trades Association of Denver, Col., will stage the biggest motor car show in the Auditorium in that city that has ever been held in the middle west, November 12 to 18. Forty-five motor car dealers will exhibit approximately 120 cars including practically all the 1918 models of the well known automobile manufacturing companies.

Newly Produced Engine in Nash Six Car

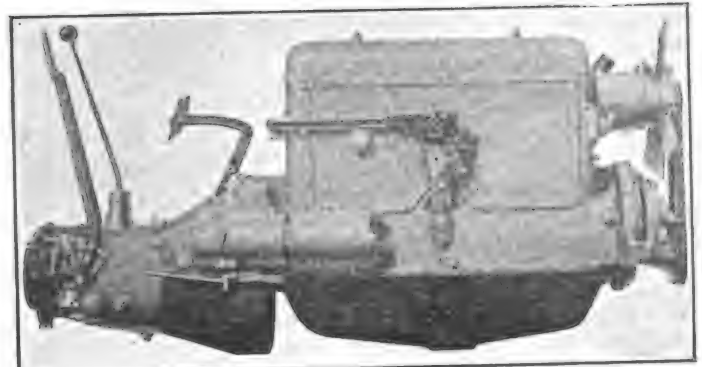
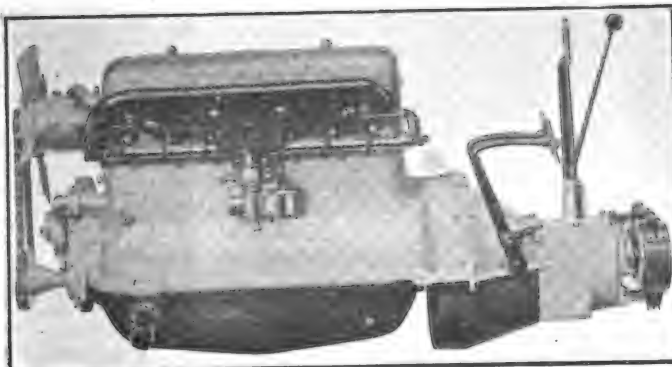
With the advent of the new automobile season, the Nash Motors Company, of Kenosha, Wis., have announced their latest product, the Nash Six. "A high quality car at a lost cost" is their slogan, and it is due to the large number of cars planned for the coming year, they claim, that their conservation prices are possible.

The gradual trend of the automobile is toward simplicity and compactness in design. It would seem that in the new Nash Six, the keynote had been struck, for, as the illustrations show, the power plant presents an exceptionally clean cut exterior. The absence of exposed units is one of its striking features while the stream line arrangement of the power plant, the location of the generator back of the fan, and the exceptional accessibility of all of the parts, are others that compel attention to this job.

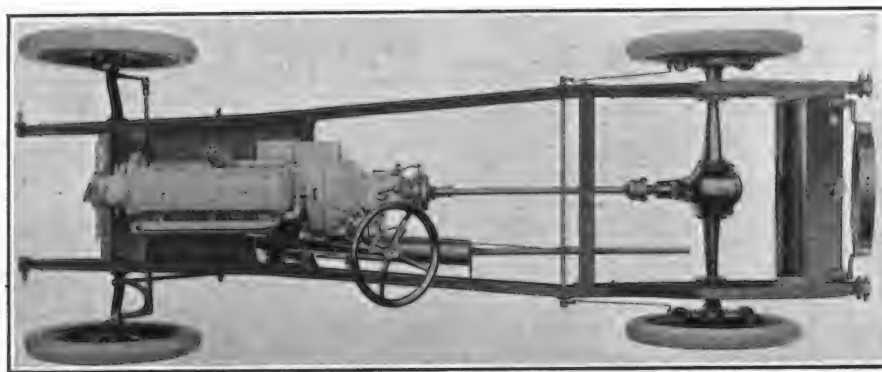
The engine is a new production by these makers, and termed the Nash perfected valve-in-head motor. Having a bore of 3¼ inches and a stroke of five inches it delivers 25.35 horsepower S. A. E. rating. Cylinders are cast in block and they are fitted with a removable head which, in turn, has a dust cover that encloses the valves, rocker arms, and valve mechanism. The valve adjustments are accessible, simply by removing two nuts and lifting off the dust cap.

In order to eliminate the vibration caused by reciprocating action as much as possible the pistons which are 3½ inches long, are light and carefully balanced. The connecting rods are made of selected drop-forged steel, double heat treated, with caps which are fastened by two chrome nickel steel bolts.

Before assembling the crankshafts in the engines, each one receives a careful examination, is tested for perfect balance and adjusted so that absolutely no vibration is present. The main bearings



Left and Right Side Views of the Nash Six Engine, with Compact Units and Enclosures Showing Streamline Arrangement of the Power Plant.



The Nash Chassis, Clean in Lines, Showing Compact Power Plant and Substantial Construction.

are especially long, the front and middle being $2\frac{3}{4}$ inches and the rear $3\frac{1}{4}$ inches. The bearings as well as the crankpins measure $2\frac{1}{4}$ inches in diameter.

The camshaft which is a one piece drop forging $1\frac{1}{2}$ inches in diameter is driven by spur gears which are enclosed in an oil tight housing at the front of the engine. Tappets are of the mushroom type, carried in a bracket bolted to the right side of the engine. This assembly, as well as the valve push-rods, is enclosed in the engine by a large dust tight cover which is removable for repairs or inspection.

A gear pump, driven by spiral gears from the cam shaft feeds the oil to the splash pans located beneath the connecting rods from the base of the engine which has a capacity of $1\frac{1}{2}$ gallons.

The water circulation through the radiator and water jackets is maintained by a centrifugal pump, the impellers of which are driven by the cam shaft extension. This unit is mounted upon the front end of the engine and fitted with a cover for examination. Air circulation through the radiator is maintained by a four blade fan, of special design, driven from the crankshaft by a leather belt. The fan is mounted upon a ball bearing shaft which serves to drive the generator unit. On the left side of the engine the carburetor is mounted and it is fitted with a hot air stove attached to the exhaust manifold. By an adjustment located upon the dash the air supply may be controlled and either hot or cold air used. The gasoline supply is also adjustable. Due to the construction of the manifolds, the intake is kept heated while the engine is in operation by the warm air from around the exhaust. Gasoline is supplied to the carburetor by a vacuum system from a $17\frac{1}{2}$ gallon steel tank, located in the rear of the chassis.

Ignition is had by the Delco system, the breaker and distributor unit being located on the right side of the engine and driven by a spiral cut gear from the camshaft. The secondary wires from the distributor to the plugs, which are located on the left side of the engine below the manifolds, are neatly enclosed in a tube bolted to the engine block. This tube serves to carry the wires to the breaker box and generator. There are, therefore, no open or exposed wires about the engine. The ignition unit is provided with a manually-controlled spark ad-

vance lever on the steering wheel.

The engine, together with the transmission gearset and clutch which are one unit, is rigidly supported both at the front and rear by a cross frame member. From the engine, power is transmitted to the gearset, through a single plate dry disc clutch with steel and asbestos friction surfaces. This type of clutch is especially smooth in action and the fabric of asbestos, gives it a long life. Hence, in unit with the engine, the transmission gearset, which is of the selective type, sliding gear, is designed for both power and flexibility under all conditions. The gear ratios are: 14.6 to 1 on low 8.2 to 1 on intermediate; 4.5 to 1 on high; and 19.5 to 1 on reverse.

At the rear of the transmission gearset is located a wide, contracting-band emergency brake, making for efficient braking as considered in modern engineering practice. Two universal joints are used, one at each end of the driving shaft, enclosed in dust proof covers. The rear axle is of the semi-floating type, made with a malleable iron center and strong alloy steel tubular ends and the differential is readily accessible by removing the rear cover which is made extra large.

All of the chassis drive and torque is through the rear springs. The power drive is through the tubular drive shaft. This method of drive makes possible,

an extremely clean appearing chassis, since there are no radius or torque rods necessary.

Made of a drop-forged, special analysis I-beam, of the reversed Elliott type, the shape of the front axle, allows the chassis to be dropped between the wheels in front, making for a low center of gravity and great stability. To compensate for the bend in the front and to allow sufficient clearance in the rear, the frame is bent up over the rear axle.

The springs both front and rear, are semi-elliptic and amply large, the front being 40 by 2 inches, composed of nine leaves while the rear is 56 by $2\frac{1}{4}$ inches and made of 10 leaves. The rear springs are underslung on the axle. All spring bolts are lubricated by oil cups. Both the front and rear wheels are of artillery type, and fitted with straight side, detachable type rims and 34 x 4 inch tires. Front tires are plain while the rear are all weather tread.

The steering gear, which is located on the left side of the car, is of the worm and wheel type, irreversible. The service brake which operates upon 13 inch drums on the rear wheels, is of the contracting band type, two inches in width. It is easily adjusted and smooth in action. Both the gear shift lever and emergency brake control are mounted at the center of the car and readily accessible. The starting and lighting system is Delco, controlled from the dash, the lighting system is fitted with headlight dimming attachment.

Three Body Models.

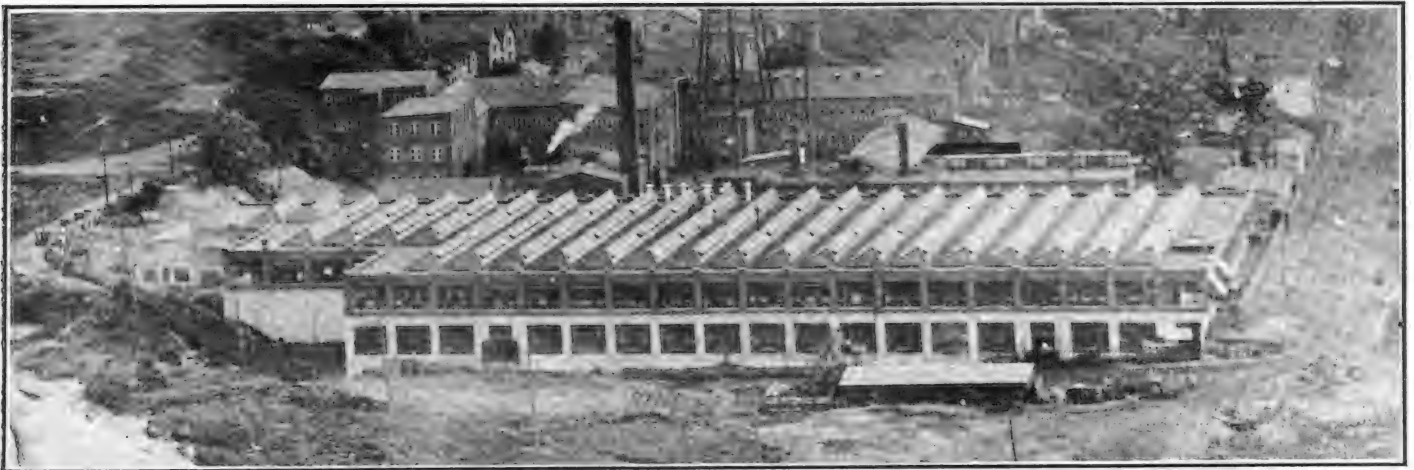
Three models of bodies are announced; a touring sedan of Springfield type mounted upon a 127 inch wheelbase chassis for \$1,985; a five and a four passenger car either of which is mounted upon a 121 inch wheelbase chassis, and selling for \$1,295 each. The body types are of a racy, streamline design, combining simplicity with beauty. Upholstering is deep, comfortable and of the lap type, known as French plaited, so that no buttons are necessary.



FOOD MAKER GROWS MORE BEAUTEOUS.

With the bounteous crops of America almost the sole hope of the world for the prevention of famine and bitter hunger, the problem of working the land with suitable machinery is of prime importance. The machine shown here is a farm tractor, drawing a harrow. Its make is the Model J 10-20 horsepower Sandusky. Notice the complete inclosure of most of the moving parts, a feature which is typical of the trend in tractor design. The hood thus has the familiar lines of the ordinary roadside automobile and is equally as artistic as some passenger automobiles that were met on the road only a few years back.

Marlin-Rockwell Corp. Plants Making Parts



Marlin Arms Plant of the Marlin-Rockwell Corporation, New Haven, Conn.

THE Marlin-Rockwell Corporation, a munitions giant in the great field of American industries, is an extensive enterprise, composed in large part of units ordinarily engaged in making a line of parts for automobiles and other motor vehicles. It is an enterprise quite distinct in its make-up from all other concerns producing bearings, wheels and radiators for automobiles, and presents an interesting study from the fact that in times of war it has prepared complete plans for the activities of peace.

The units composing the Marlin-Rockwell Corporation are the Marlin Arms plant in New Haven, Conn.; the Mayo Radiator plant in the same city, the Rockwell-Drake bearings and machinery plant in Plainville, Conn., and the Standard Roller Bearings plant in Philadelphia.

The purchase of the former Marlin Arms Co. at New Haven, Conn., served as a nucleus around which to develop constituent companies by the acquisition of established industries or units, notably in automobile parts, such as ball and roller bearings, steel balls and radiators. In a recent announcement of the policies of the new company it was stressed as an important fact that the products of the constituent companies are so substantial in quantity and excellent in quality that they will constitute the foundation of the business.

Additional significance is loaned to this undertaking by the fact that these various products are used in a multitude of industries outside of automobile manufacture (which is served in all its branches of passenger cars, commercial cars and trucks), including farm tractors, aeroplanes, motorcycles and all machinery or devices using ball bearings or steel balls.

The Marlin-Rockwell Corporation is young in the fact that it was founded less than two years ago—in December, 1915—to be exact—but it is old in the sense that three in four of its components are manufacturing units which have been estab-

lished for long periods of years, that its officers and executives have been identified with manufacturing in these lines for long periods and have experience both in production and distributing. Besides this they know the fine mechanical requirements and quality demands of the motorists and the vehicle industries of America. With keen appreciation of the fact that high grade bearings are one of the leading essentials of all modern machines and a superlative requirement in those which traverse the highways of the land either on ordinary roadways or on steel tracks, the company took steps to include their production within its widening scope.

For this reason, as one of the most important links in their chain of large manufacturing establishments they acquired the assets of the Standard Roller Bearing Co. of Philadelphia. This plant occupies ground a half a mile in length, with an area of half a million square feet, adjoining the tracks of the Pennsylvania railroad. There the company manufactures "S. R. B." maximum type annular ball bearings, improved type taper roller bearings, steel balls and Rudge-Whitworth wire wheels, and their several products, it is maintained, after passing through a series of highly specialized processes, reach the highest grade and accuracy ever attained in products of this kind. Owing to the well developed sales organization of the Standard Roller Bearing Co., it directs the sales of the constituent companies, with the exception of the Marlin Arms division.

Of extreme mechanical interest in this plant are the activities of the steel ball division, in which, by numerous careful and painstaking processes the production proceeds from the rough steel rod to the finished ball. The steel is made from a special formula evolved in the company's metallurgical department after patient and exhaustive experimentation. It is a chrome alloy steel, which is wear resisting, tough, strong and of a uniform degree of hardness. The steel ball plant is a highly specialized manufacturing organization,



Buildings of the Standard Roller Bearing Co., Philadelphia, Pa., Occupying Ground Covering Half a Million Square Feet.



New Buildings at Rockwell-Drake Plant, Plainville, Conn.

in many departments equipped with special automatic machines designed and built expressly for the work of this company.

The uniformity of size is vital to the efficiency of a ball in a bearing. The "S. R. B." chrome alloy steel balls are made in various standard sizes, but because it is impossible to make hard steel balls of absolutely identical mean diameter as they come from the polishing process, a batch of any standard size balls will show various microscopic deviations from the standard size ($\frac{1}{16}$ for instance). They are, therefore, subjected to a gauging test which automatically discards from use those in excess of four ten-thousandths above or below the standard $\frac{1}{16}$ size, and separates those within these limits of tolerance into nine groups by their ten-thousandths of an inch in size. It is effected by making the balls run continuously but slowly along an inclined plane with 10 holes, each one-tenth of an inch wider in diameter than the one above it, and under each hole a runway leading to a separate pan. The top hole receives all those below the limit of tolerance, the second is .0004 minus, the last is .0004 plus, and all larger than that are above the limit of tolerance and are discharged through a channel at the end of the gauge. The groups are separated into cardboard boxes all labeled as $\frac{1}{16}$ balls, but also designating their degree of deviation thus: $\frac{1}{16}$ -.0003 of $\frac{1}{16}$ +.0002 and so forth. In filling a bearing the balls of that bearing are all taken from one box and are thus uniform.

In roller bearings this company is now manufacturing a taper unit in accordance with a new scheme of construction as regards the shape of the cone and roller, presenting an effective bearing surface over their entire length and therefore, it is asserted, supplying a maximum radial load capacity for a given length of bearing.

Operating in conjunction with the other units the Rockwell-Drake Corporation is engaged at Plainville, Conn., in the manufacture of ball bearings of improved types, and of machinery for the manufacture of ball bearings. The property occupied is about 10 acres in extent, the works have 13,000 feet of floor space and the plant has a full modern equipment. In the policy of expansion of the directing company improvements are under way there at the present time. The main building is 130 feet long by 100 feet wide, and is being extended to make it 250 feet long by 100 feet wide, with an ell which is 130x100 feet in dimensions. The small building at the Plainville plant is 75x50 feet and is to be enlarged so that it will be 225 feet long by 50 feet wide. This plant was

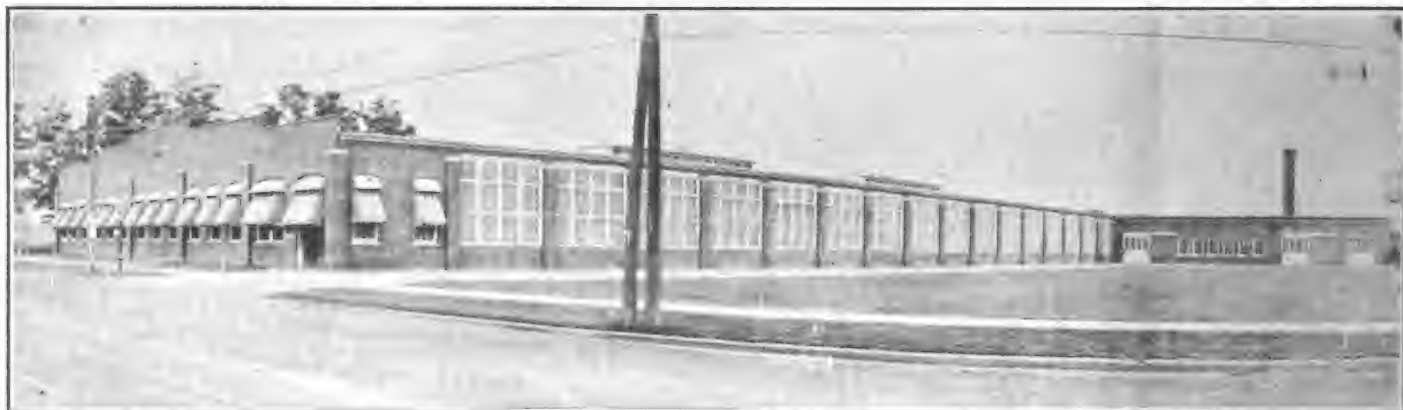
established in November, 1915, by H. M. Rockwell of the Marlin-Rockwell Corporation, and Leon Drake, who is now works manager at the Mayo Radiator, and it became a part of the Marlin-Rockwell Corporation in March of this year.

The Mayo radiator for automobiles and motor trucks is the sole product of the unit of the Marlin-Rockwell Corporation at New Haven, which, as the Mayo Radiator Co., was incorporated in 1905. The property has an area of

more than 350,000 square feet, allowing ample room for expansion, and the production activities are housed in a one-story building 365x100 feet, with an ell which is 150x40 feet.

The plant is equipped with machines of improved design for the various operations. The radiator is of the "honey-comb" type and is made in various sizes to suit the numerous high-grade automobiles for which it is the standard equipment. The radiator sections are built up from flanged strips of brass or German silver of required width from a roll of sheet metal spooled on a mandril from which it is automatically fed to a machine which, at right intervals, bends and close crimps the metal into double thick flanges. As the end of the flanged metal strip reaches a certain gauge pin an attendant cuts off a length which represents one length of the 10 or more which make up the radiator section. The lengths, lightly tipped with solder to hold them together, are assembled into a section of the radiator and placed in a frame, which is tightened until it is in proper binding to be soldered together at one tip in a solder bath.

Referring briefly to the Marlin Arms unit, a marvel of industrial interest and efficiency, which constitutes the initial unit of this corporation, the spirit of the whole enterprise is shown. In its specialty of machine guns the Marlin Arms has created an enormous capacity, representing, it is asserted, probably two-thirds of the world's production. The plant as it stood when the Marlin Arms Corporation was organized after the purchase of the Marlin Arms Co. in December, 1915, was in no degree equipped for this quantity production. The organization was made under the leadership of Mr. A. F. Rockwell of Bristol, Conn., a manufacturer of successful record, associated with Mr. Edgar A. Park, skilled in the organization of large enterprises; Mr. Louis E. Stoddard, financier and capitalist, and some others, to engage in the manufacture of machine guns, primarily on the basis of a large contract with the Russian government. The gathering of thousands of skilled mechanics was a monumental achievement in the existing economy; the varied processes and mechanical perfections make a wonderful theme of industrial progress in war times which cannot here be detailed because of space limits. The Marlin plant now works on an extensive order for the United States government. After war demands are at an end the plant will continue on a better and more efficient scale the manufacture of Marlin repeating rifles, shot guns, etc., for which the original Marlin plant has an old and well sustained reputation. The plant, closely built, occupies ground 600x600 feet in area and uses 150,000 square feet of floor space.



Mayo Radiator Plant, New Haven, Conn., Producing Automobile and Truck Radiators Under the Marlin-Rockwell Corp.



Accessories Department



MORE-LITE LENS.

That the widespread nuisance of glaring headlights is being suppressed by state legislation is a fact that is welcomed by the greater part of the autoing public. Headlight glare is one of the greatest evils of the automobile world, and is the direct cause of a great number of accidents. The owner riding behind his own glaring headlights is in as great a danger of collision as is the operator of other machines. Every motorist sooner or later faces the problem of equipping his car with non-glare lenses.

The More-Lite auto lens is designed to diffuse the headlight beams, to distribute the light ahead of the car where it is most needed, yet not to cause any blinding glare. This lens is made of either clear white or amber glass, highly ornamental, and for practically any size headlight.

Manufactured by L. E. Smith Glass Co., Mount Pleasant, Pa. Prices range from \$1.50 to \$2.25 for clear white lenses; and from \$2 to \$2.75 for amber.

BUELL EXPLOSION WHISTLE.

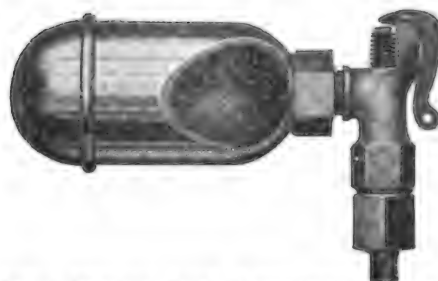
A distinctive and new warning signal is introduced under the trade name of Buell explosion whistle. As the name indicates, this device is operated by the pressure caused by the explosion in a gasoline engine. Mechanically it consists of a fitting which may be screwed into the engine in place of the priming cup and in which is fitted a small poppet valve of $\frac{1}{2}$ inch in diameter. The valve is opened by a control cord which may be fastened to the steering column, allowing a small amount of gas to pass through it and operate the whistle. The makers sell the device under a ten years' guarantee and claim that under ordinary conditions it will last longer than the car itself.

The warning is said to be distinctive enough to command instant attention even above all other traffic noises.

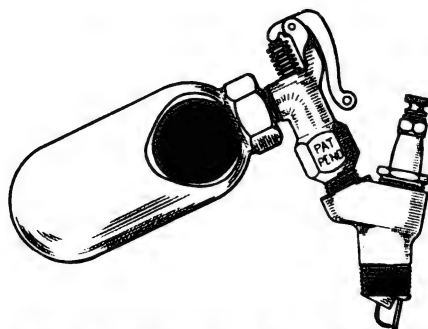
Manufactured by Buell Co., 1610 So. Michigan Ave., Chicago, Ill. Price for single tone with valve \$4.25; chime model with valve \$6. Special plug without whistle for Ford car attachment \$1.25, whistle extra as above.



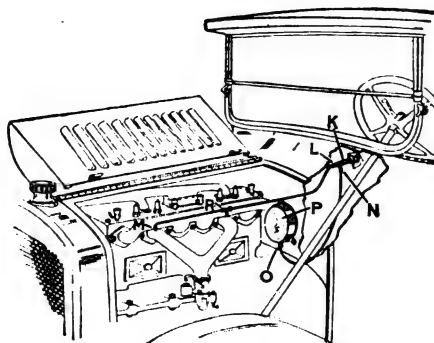
More-Lite Lens.



Buell Regular Type Explosion Whistle.



Buell Ford Type Explosion Whistle.



Imperial Primer Applied.

SILCO GEAR GREASE.

Steam cylinder oil has long been recognized by experts as the ideal lubricant for gears, bearings, etc., but considerable difficulty has been experienced with leakage, due in part to its sensitiveness to temperature changes when used alone as an oil. The manufacturers claim that Silco greases retain the lubricating value of steam cylinder oil, eliminate all its disadvantages, and possesses the additional merits of following the gear teeth and silencing noisy gears. This product is manufactured from a base of super-refined steam cylinder oil, to which, by a special process, is compounded a body which is said to be at all times and under all conditions of a stiffened creamy consistency, unaffected by weather conditions.

This grease, which the manufacturers claim will not leak out of casings nor drip from bearings, is made in four consistencies; light, medium, heavy, and Ford Special, all of which are guaranteed to lubricate satisfactorily differential and transmission gears. It may be obtained in 5 or 10 pound cans, or 25 pound pails.

Manufactured by International Lubricants Co., 161 Devonshire St., Boston, Mass. Write for prices and samples.

THE IMPERIAL PRIMER.

Starting an engine quickly and easily in cold weather is becoming more and more of a problem, in these days of a constantly lowering grade of gasoline. The Imperial Primer is a simple, easily installed device that is operated from the cowl dash and is designed to spray a rich mixture of vaporized, fireable gasoline into the manifold, near the intake ports.

The device consists of a small, substantially made plunger pump (K) with the necessary bolts, connections and tubing for mounting upon the dash of any car. To the pump are connected two tubes L and N. The tube N is connected with a priming tank P, into which is placed high test gasoline, obtainable at practically any drug store. The pipe L connects with the intake manifold at R. and M. Under ordinary conditions, three fillings of the tank are sufficient for the Winter season's usage. Though

high test gasoline is recommended, lower test gasoline may be used with good results.

As the connections, L, M, N, O, and R, are made by means of compression couplings, no soldering, flaring or threading is required for attachment.

Manufactured by The Imperial Brass Mfg. Co., 1200 West Harrison St., Chicago, Ill. Write for circular and prices.

B-W DIRECT CURRENT AMMETER.

That the proper functioning of an automobile engine is directly dependent upon its electrical system, goes without saying. Only by constant attention, can the system be kept in satisfactory condition. As a watch is to a train engineer, so is the ammeter to an automobile driver. The ammeter is a check against the electrical system, and indicates just what is going on in this department, so to speak. The B-W direct current ammeters are made in both flush and surface types, and may be obtained in either nickel or black rubberoid finish. The makers claim that car vibration does not effect the meter reading, and that due to the large permanent magnet and other design, the device holds the zero position exceptionally well.

Manufactured by Ballman-Whitten Mfg. Co., 2867 Gravois Avenue, St. Louis, Mo. Price \$1.90.

PRESTO ELECTRIC HEATER.

A new accessory which has just been put on the market should be of great interest to motorists who plan to run their car during the winter months, yet are unable to afford a heated garage. This device is an electrical engine heater called the Presto and operates upon ordinary electric house current. It measures 12 inches in length and is designed to hang under the hood, near the carburetor or radiator, distributing the heat where it is most needed. With the heater is furnished ten feet of cord and an attachment plug for any electric light socket. It may be used on 110 volt current, either direct or alternating. The manufacturers claim a very low cost per hour operating this attachment and say that with it the engine is kept to an operating temperature, regardless of outside temperatures.

Manufactured by Metal Specialties Mfg. Co., 338-352 N. Kedzie Ave., Chicago, Ill. Write for prices and literature.

SPECIAL FORD STARTER.

Illustrated herewith, is a mechanical starter for Ford cars that should be of interest to every Ford car owner. This device is said to be simple in application and to require but a few changes of fittings. With this form of starting device, the makers claim that all chances of kick or back-firing are eliminated. It is built entirely upon the engine and consists of a special ratchet engaging device a flexible chain, a starting pedal and a priming pedal. The operation is simple. When idle, the starting pedal lies forward on upper floor board, and



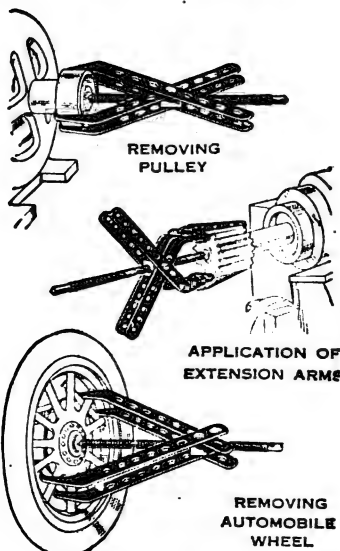
Klear-Sight Cleaner.



Presto Electric Heater.



Special Ford Starter.



Little Giant Wheel Puller.

locked down. To disengage it, it is only necessary to press down a plunger which extends up through the floor board directly under the reverse pedal. This plunger is also a primer, and when pressed down at the same time as the starter pedal, the engine is primed. Thus the plunger serves to disengage the pedal and to prime the carburetor if priming is necessary.

The manufacturers claim that but from 30 to 40 pounds pressure upon the pedal is necessary under ordinary conditions to start the engine; not much more than is required to compress the clutch pedal of some of the larger cars.

Manufactured by The Equi Light Company, Inc., Paducah, Ky. Price \$20.

LITTLE GIANT WHEEL PULLER.

The old methods of driving off pulleys and gears with a hammer and a bar of iron often resulted in damage to the parts due to the jar and vibration. A wheel puller is the logical thing to use when gears, pulleys, or wheels are firmly fixed to the shaft. For this purpose, the Little Giant gear and wheel puller has been designed. This device is made of four bar arms of drop forged steel with hooks and adjustable center bolt which admits of adjustments up to 13 inches. The arms are so arranged that with the pressure screw in place there are four pulling points so distributed that there is no need for a holding or steadying bar. The puller prongs are designed to give maximum strength, yet to occupy little room. For this reason they may be used for removing timing gears or other gears where room is limited.

This device is handy in removing inside work and for inside pulls. For removing small pulleys or gears a pair of extension arms may be used. These arms are provided with a locking arrangement for fastening to the pulling arms and provide for two pulling points, rather than the four as in the primal attachment.

Manufactured by Premier Electric Company, 4032 Ravenswood Ave., Chicago, Ill. Price for "Little Giant," \$10. Extension arms \$1.

KLEAR-SIGHT CLEANER.

Many of the accidents during a rain or snow storm can be traced to obstructed vision, due to collections of moisture upon the windshield. The Klear-Sight is a little device which is designed to be clamped over the windshield. It is so constructed that a rubber strip is pressed against the outside of the windshield glass, and by an easy motion across the shield, snow, rain, or moisture is wiped away, leaving a clear vision. The device is made of tempered, cold drawn steel and equipped with a so-called wear-proof rubber. No change in the windshield is required, as the device may be snapped over the top of the shield or between the two sections.

Manufactured by the U-Auto-C Corporation, 21 West 38th St., New York, N. Y. Price \$2.

Providing Gasoline for the Allies and Us

Address Delivered at the War Convention of American Business Men, Held Under the Auspices of the National Chamber of Commerce at Atlantic City, N. J. in Month of September 1917

By A. C. BEDFORD
President, Standard Oil Company N. J.

UNDER the general heading, "How American Industry Can Help Win This War," the topic assigned to me is "Priority and Distribution." The matter of distribution, of course, involves supply and conservation. I can speak on any such topics only in so far as they include affairs within my own experience. Perhaps a statement of the concrete experience and problems of the industry with which I am identified may have lessons which will prove illuminating to other industries.

The fundamental problem confronting the petroleum industry is that of supply. Next to an ample quantity of munitions of war and food, nothing, with the possible exception of coal, is so absolutely vital to winning this war as petroleum and petroleum products.

They tell us the war is to be won in the air. Our country is said to be building large numbers of aeroplanes. Our Allies are building flying machines as fast as they know how. Vital to the very existence of these aeroplanes is the highest grade of gasoline which can be produced.

Four Tons of Material to Every Soldier.
We are to send great armies to Europe to supplement those of our Allies. They

say that four tons of material must be shipped for every soldier transported. In France most of the transportation must be done by motor lorries. When our army is fully equipped, some 35,000 motor lorries will be required. These

the prospect is that the present year will call for 8,000,000 barrels of gasoline for the use of our Allies in Europe.

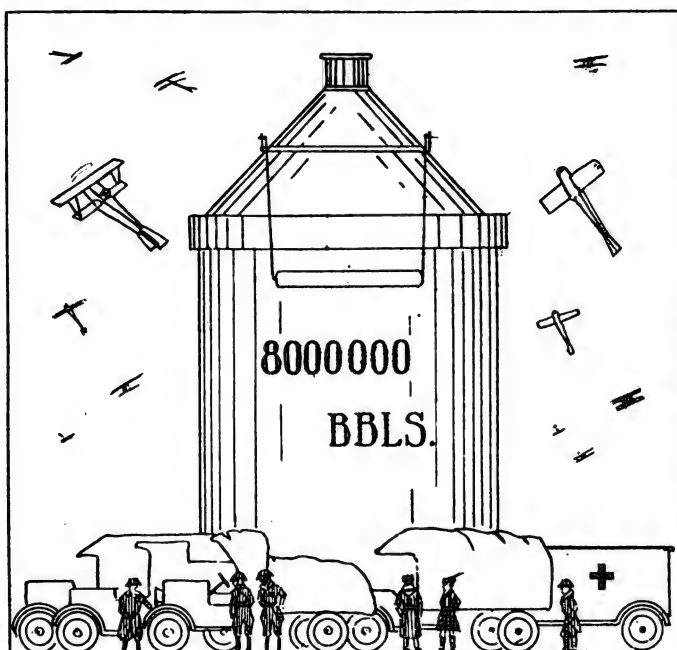
What Allies Expect of Us.

Our Allies also look to us for the bulk of their supply of fuel oil, and petrol-

um products of every form for the use of their merchant ships, their navies and their armies. With the Galician and Roumanian oil fields in Europe in the hands of the Central Powers, and with the available supply of Mexican oil reduced by reason of the shortage of shipping tonnage, the United States is the largest and nearest source of supply for the oil in all its forms, which is so absolutely necessary to win this war.

I have given some indication of the needs of our own government and our Allies for petroleum and petroleum products necessary in the actual conduct of warfare. Many of these uses are entirely or relatively new; others are upon a scale hitherto undreamed of. Certain it is that all of them call for an ever increasing supply of petroleum.

And the demand for petroleum and petroleum products not alone is the actual conduct of the war. Up to relatively a few years ago, the chief use



Prospective Gasoline Demand the Present Year for the Use of Our Allies in Europe.

will require gasoline and lubricating oil in large quantities.

Our Government is building at the greatest possible speed merchant ships and men-of-war. We have appropriated hundreds of millions of dollars for the gigantic task before us. These ships will call for fuel oil, lubricating oil and gasoline to an extent beyond any precedent.

To protect our coast against submarines, our navy has created a Mosquito Fleet, consisting in a large measure of motor-boats. There are thousands of motor-boats operated in American waters, although, of course, not all are for purposes of national defense. The operation of every such vessel, whether for pleasure or for strategic purposes, calls for a continuous supply of gasoline and other petroleum products.

Our Allies, too, are calling for oil in all its forms in ever-increasing quantities. In 1915 this country exported about 5,000,000 barrels of gasoline, whereas in 1916, 7,120,000 barrels were sent abroad.

Munition cars, ambulances and self-moving vehicles of every kind are increasing daily in the theatre of war, and

WHY TO SAVE GASOLINE.

Saving gasoline is something the motorist wishes most heartily to do because it will be "doing a bit" toward winning the war and because such conservation is vital to the continuance of motoring privileges. Why to conserve gasoline is told in Mr. Bedford's paper, an expert discussion revealing graphically consumption's enormous pressure on production, presented herewith, but slightly abridged in form as it was presented before the war convention of business men. How to save gasoline is presented to the motorist in brief, concise instructions on this same page, and a constant reminder in similar terms to do so is being put in every service garage in the country by the National Automobile Chamber of Commerce.

HOW TO SAVE GASOLINE.

Don't allow your engine to run while the car is standing.

Coast down the hills, thus saving both engine and gasoline.

Keep the carburetor adjusted; cut the adjustment as low as possible.

Watch the fuel line; don't let it leak.

Don't use gasoline for cleaning; use kerosene or alcohol.

Keep the cylinders clean, thus saving fuel and obtaining power.

Don't fill the tank too full, so that gasoline will waste by spillage.

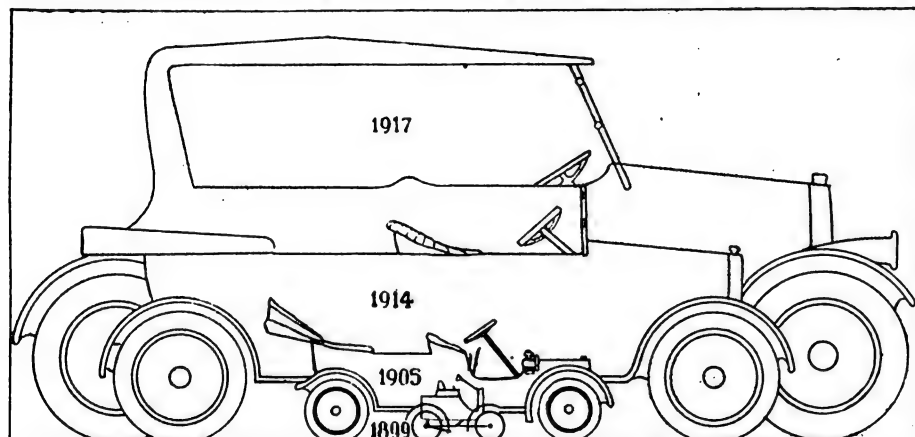
Save gas and the car by changing gears rather than climbing a hill with the throttle open.

Tires fully inflated are an economy; soft tires consume power.

of petroleum was for kerosene and lubricating oil. With the development of the internal combustion engine and its adaptation to the automobile, we found an entirely new use for gasoline, which, up to that time, had been considered an unimportant byproduct of crude petroleum. Now it has come about that the chief value of petroleum consists in its gasoline content, and while England and our Allies are calling in loud tones for more ships, and more ships, the world of warfare, of trade, and of pleasure, are calling in ever-higher tones for more gasoline and more gasoline.

The Automobile Giant.

The increase in the number of automobiles manufactured in the United States has been little less than miraculous. In 1899 there were 10,000 motors in this country. In 1905, only 85,000 cars. Yet by 1914 there had come to be 1,253,854 cars, and by the 1st of July of this year, approximately 4,000,000. The production of gasoline brought about by this extraordinary demand, jumped from about 6,000,000 barrels in 1899 to some 45,000,000 barrels in 1916, and will probably be over 50,000,000 barrels in 1917.



Increase of Automobiles in the United States from 10,000 to 4,000,000 Almost Miraculous.

In addition to all the demands for gasoline, there has been a great call for petroleum for fuel oil, for road-making, for use in farm tractors, and for use in small farm engines. Every part of the oil is being put to some useful purpose, and the value of the by-products is increasing day by day.

In response to the demands thus created, there has been tremendous development in the production of crude oil in this country. The consumption of crude in 1904 was 117,000,000; it rose steadily to 324,000,000 barrels in 1916. For several years prior to 1916, the production of petroleum in this country had been in excess of the consumption. In 1916, whereas over 308,000,000 barrels of crude oil were produced in the United States, the consumption amounted to over 324,000,000 barrels of crude oil of American production. In addition to this 324,000,000 barrels, we absorbed in this country 23,000,000 barrels of Mexican crude.

Consumption Exceeds Production.

The figures for the first six months of the present year are highly illuminating, and present a picture which it is the

duty of every one of us to consider carefully. The figures available for the first six months of this year show that the rate of production of crude oil indicates a total production for the year of 312,000,000 barrels, whereas consumption was going on at a rate of approximately 330,000,000 barrels for the year.

On the 1st of January, the amount of petroleum in storage in the United States was 174,370,500 barrels, whereas on July 1st, 164,590,942 barrels were in storage—a reduction of 9,779,558 barrels. This reduction is, however, largely in California stocks, in which state the situation is serious.

It will thus appear that with the stocks above ground and given the present rate of production and consumption, the supply is sufficient to insure our having enough oil for at least the next five years—provided the production is fairly maintained. So while the occasion is not one for alarm, it is one for taking intelligent measures toward adequate production of what we need. Such is the situation confronting the Petroleum Committee appointed by the Council of National Defense, to co-operate with the

time at a rate of about 312,000,000 barrels annually; it is consuming it at the rate of over 330,000,000 barrels; and the refining capacity is upwards of 350,000,000 barrels. The pipe line and other transportation facilities now existing and in the process of construction are reasonably ample to take care of the situation.

The refiners not only have increased their capacity to take care, by existing processes, of crude production to supply existing demand, but they have employed the most expert talent in efforts to extract from crude petroleum gasoline and other products which are most in demand. Had it not been for the introduction of the "cracking process," invented by Dr. Wm. M. Burton of the Standard Oil Company of Indiana, and other similar processes, the supply of gasoline would long ago have fallen far short of the actual requirements.

Great progress has also been made under pressure of necessity and enterprise, in producing gasoline from the casing-head gas and natural gas. This year approximately 2,500,000 barrels of gasoline will probably be obtained from this source, with more probably, next year.

55,000,000 Barrels Next Year's Need.

But when all has been accounted for, the fact remains that this country will next year require at least 55,000,000 barrels of gasoline, and that amount simply cannot be obtained from the quantity of crude petroleum now being produced.

The fundamental and vital problem confronting the petroleum industry today, is to increase the production of crude oil.

Here, then, are the broad outlines of our problem:

What should be borne in mind is that petroleum products, and particularly gasoline, while vitally essential to the uses of war, also have other uses intimately related to the comfort and satisfaction of our daily lives. It can be said easily that we could get along without the automobile. The same could be said of the telephone. But we know that without these instruments of civilization, the horizon of our life would be greatly reduced, and much of the efficiency and happiness of our civilization would be curtailed. The automobile has come to be not a mere article of luxury to the rich man, it has come to be a necessity to the merchant and the manufacturer in the cities, to the farmer on the plains, and to the miner in the mountains. The automobile industry has become one of our great national assets, contributing enormously to the progress of civilization itself.

No Crimping of Automobiles.

It would be a great misfortune if any policy would be adopted or any procedure taken, not absolutely necessary for the successful conduct of the war, which would hamper or handicap in any way the growth and value of the automobile industry as a manufacturing enterprise, of the successful and efficient use of the automobiles already in the possession of the public. Our national policy therefore should be directed toward pre-

Government in meeting its oil requirements.

This Committee, which is composed of men active in the production and refining of petroleum, has addressed itself wholeheartedly and unselfishly toward the work committed to it.

Petroleum Committee's Work.

The supreme problem which has confronted our Committee in its efforts to serve the Government has been the problem of supply. The oil industry is distinguished from the coal and many other industries in that the problem of supply does not depend upon the present facilities for manufacturing or transporting. Figures compiled a year ago showed that there were 302 refineries in this country, with a daily capacity of 1,043,245 barrels of crude. The refining capacity of the country was increased by 50 per cent. in 1915 and 1916, and at least fifty new refineries were projected at the time the figures above named were compiled. The oil refining capacity of the country is indeed greater than the present demand.

The situation in a word is this: The country is producing oil at the present

serving as nearly as we can all that we have, and taking care of the needs that are upon us.

It is true that immense economy in the use of gasoline could be effected by present owners of automobiles. There is no reason why everybody should not continue to use motor cars in their business, in movement from farm to village, or even in their pleasures. There is, however, an immense amount of utterly unnecessary use of the automobile which could be curtailed. Likewise, considerable saving could be brought about by more intelligent handling of the automobile engines themselves. The mere matter of letting engines run while cars stand still is a little thing in itself, but in the aggregate it results in an immense waste in gasoline.

The automobile producers of the country also have a great duty to the public to perform, not only in manufacturing the best possible car, but in instructing the users of cars on how to obtain the highest results from their gasoline consumption. Furthermore, there is still a great range of possibility in the invention and improvement of automobile engines in effecting more economical consumption of gasoline.

More Wells, and Then More Wells.

But the great thing to be done, the absolutely necessary thing, is to induce producers of crude oil to make greater and greater effort toward obtaining a large product. The price should be sufficiently attractive to induce more and more people to drill wells, thus insuring a steady supply, and offering always a great pool which will make the whole situation suddenly easy.

We must bear in mind the fundamental difference between the nature of the

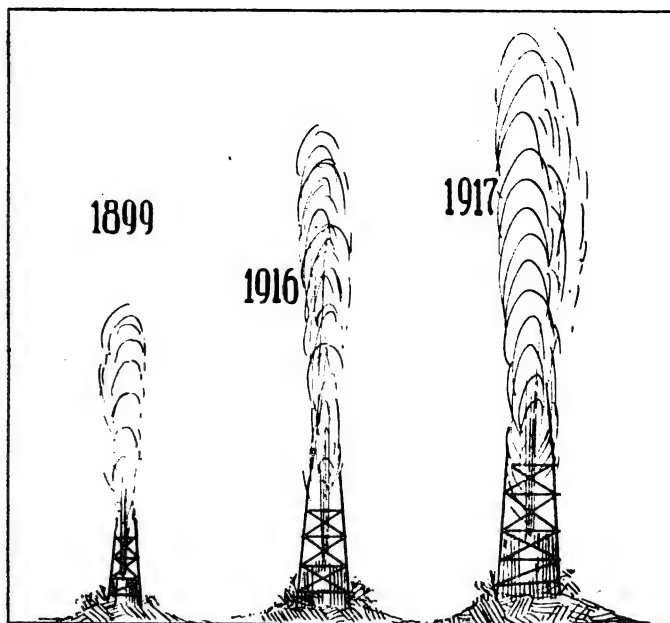
problem of stimulating the production of crude oil and that of increasing the output of any other industry which is under the stress of supporting the government in this war. In the oil business the problem is not that of speeding up the production of existing wells; their output is determined by natural conditions and can be affected to a very slight extent by man's efforts.

The oil situation is unique because increased production can only be secured through drilling new wells. New enterprises must be undertaken and new capital enlisted. This is impossible in the face of higher costs and a larger percentage of failures because of dry wells unless the profits to the producer of crude petroleum remain attractive.

Rule of Supply and Demand.

I do not propose any plan whereby there can be a chance of a runaway market price, either for crude oil or for the refined product. But an exceptionally large percentage of refined petroleum products is consumed by those wanting it for use in automobiles and not necessarily to keep themselves alive, as they need coal or food, but because such use is desirable in the rounding out of one's life and in the promotion of one's business. The law of supply and demand, with reference to this great field, involving the use of the automobile in our daily lives, should therefore, be given reasonable opportunity to operate. Certainly every possible inducement should be held out which it is necessary to hold out to bring forth a greater increased quantity of crude oil production.

To conclude, let me say that there is not the slightest danger of there being a deficiency either of crude or refined products necessary for the uses of our government, or for the uses of the Allies, in the conduct of this war. America is pro-



Crude Oil Production on Its Rising Scale Has Not Kept Pace With the Demands Upon It.

ducing and can produce all that will be needed for these purposes, and I suggest the following policies as ones which should be adopted with references to the subject as a whole.

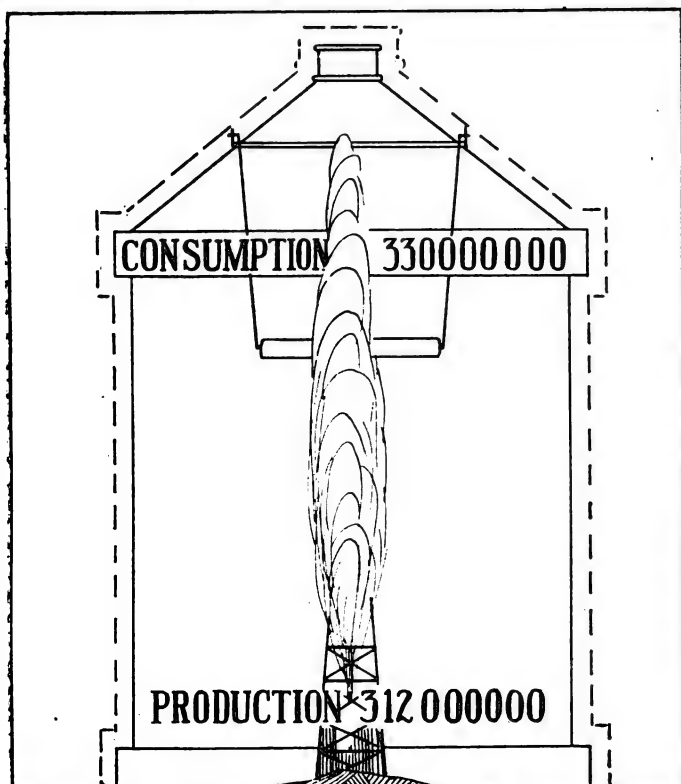
America First; Car Economies.

1. Our Government should receive the first call upon all petroleum produced, either for itself or as it may designate for the use of our Allies in their conduct of this war.

2. The petroleum industry is not, so far as prices go, on a war basis. I mean by that statement to say that the prices are reasonable and fair and no undue advantage has been taken because of either the extraordinary demands due to war conditions or increased costs or shortage of crude. Prices have not materially advanced during the present year in spite of the increasing costs due to increases in wages and high costs of material, and I believe the trade generally will maintain that position, making only such advances in the prices of their products as may be necessary to meet increase in costs of manufacture or material or crude oil.

3. Should, however, there develop a tendency towards the establishment of a runaway price, for instance, for gasoline, it would invite Government regulation of prices.

4. Within these limitations, the law of supply and demand should be permitted to operate freely. There should be a campaign of education of automobile users, showing them how they can obtain the utmost usefulness from their cars with a minimum consumption of gasoline; and above all else, every possible inducement, patriotic, educational, and financial, should be given to the crude oil producers of the country to bring forth from the earth—where plenty of oil is still concealed—all the crude petroleum which may be necessary not only for the conduct of the war, but enough to insure the progress and comfort of our daily lives.



Gasoline Can Empties More Than the Wells Produce—Dotted Line Shows Present Refining Capacity Almost Reached.

PLATE X

GARAGE FOR A SMALL CAR ON THE HOME LOT

By Making Use of Readily Available Material and the Accompanying Design the Handy Man Can Build This One Himself at Low Cost

Designed by the Architectural Department of the Automobile Journal Publishing Co.

THE garage plan presented in this issue is designed for a building to house the small passenger car primarily, although it may be used for larger cars, and its construction is of a character that makes the cost low enough to place it within the reach of every car owner of the thousands who have them. In a word it is a popular garage such as is in great demand.

While inexpensive to erect the building is so designed that it will not detract in any way from the appearance of a place, but on the other hand, if kept in repair and painted should greatly enhance the value of the premises on which it is located. It is solid and substantial and while not of fireproof construction the cost of insuring it is so slight that full protection can be carried and the owner feel the same assurance against loss as if he had invested twice as much in a building of fireproof or semi-fireproof materials.

The building is 12 feet wide and 18 feet long, made entirely of wood with a concrete foundation and floor. The frame is built of 2x4 studs erected on 4x6 sills with 4x4 plates and 2x8 rafters. It is walled in with novelty siding and the roof is boarded in and shingled. There is no work about the structure, in fact, that cannot be done by the man who is handy with tools. The studding and rafters should be of good spruce, the former placed 16 inches off centre and the latter two feet apart. The sills should be of yellow pine. Girts of 2x4 studding placed horizontally every three feet in height between the upright studs should be used to provide the proper stiffness to the frame.

The roof rafters are cut as shown in plan, forming small buckets along the eaves and adding greatly to the appearance of the building, as does also the extension of the front elevation above the roof. A large front entrance, eight feet wide and nine feet high is closed with two swinging doors, paneled, with the upper panels formed of sashes set with eight panes each. This feature is another important point in the appearance of the garage.

There is also a door in the side, so access to the inside may be gained without opening the large doors in winter time and admitting the cold air. Windows may be either of the drop in type or pintled as the owner desires.

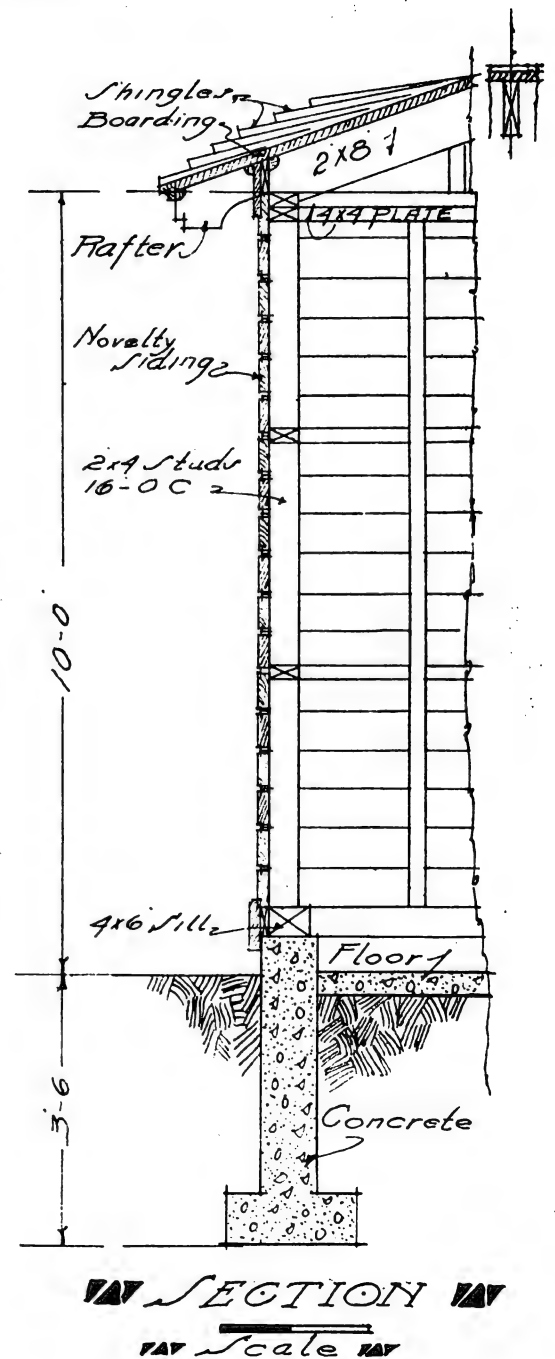
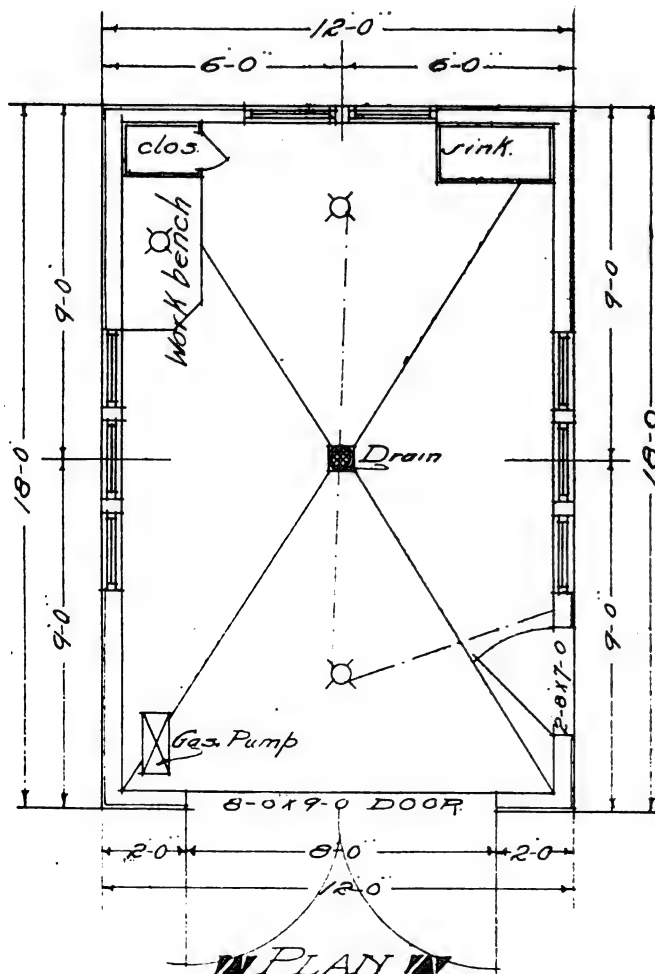
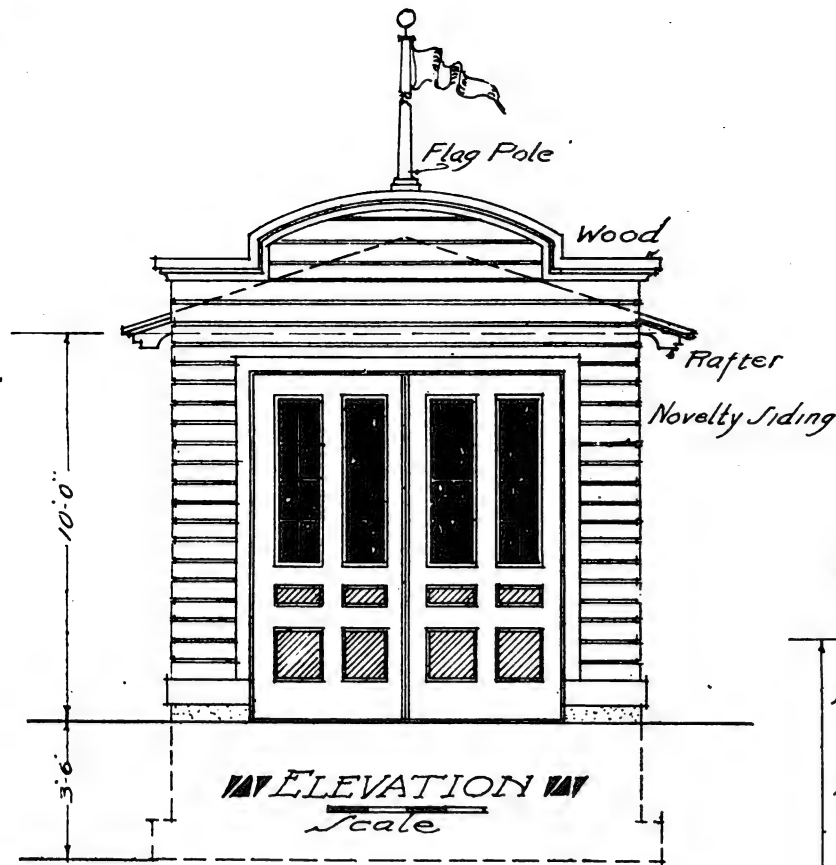
Sufficient room is provided in the building for a good sized work bench, closet, sink and gas pump. The locations of these installations are shown on the ground plan, together with the centre drain, which is placed in position before the concrete floor is cast. The floor is sloped gently toward the centre to drain off the water when the car is being washed. If the drain is to be connected with the sewer drains provision should be made before the foundations are laid and similar attention should be shown the placing and connection of the gas pump stand with the tank under the ground on the outside.

Foundations should be laid below the frost line, about three feet six inches, and extend above grade to form an underpinning. A lean mixture for the concrete is sufficient, one part cement, two parts sand and five parts of coarse aggregate providing an amply strong foundation for the size of the building. This mixture would also be suitable for a foundation for the floor, but the surfacing, an inch or more thick, should be composed of one part cement and one part sand.

Practically 30 per cent. of the cost of such a garage is represented in the labor costs. If a man did all or part of his own work the building would stand him in less than \$200. Material sufficient for the structure might be secured for one-half that amount, in favored localities, by the exercise of cautious buying and care in the selection of timbers for interior unexposed places. A self-builder of a commodious and fine garage on the rear of the home lot availed himself of an opportunity to buy for a song recently 30 or 40 concrete blocks taken from a dismantled building. They made a very fine sill course. Another was watching his chance and obtained enough 3x4 inch studding to build his garage at a less cost than if 2x4 inch studding had been bought new. Taken all in all the garage on the home lot is an ever old, ever new proposition. It needs but be tight and snug and its services will be manifold.

The width, depth and clearance of this one car garage is sufficient so that if care were used in driving in through the doors a car of a large touring type could be housed. For the tour-about or small four or five-seater, however, the dimensions and the garage are more serviceable.

PLATE X



General News and Views of the Industry

Wallace C. Hood, former proprietor of the service bureau at Detroit bearing his name, has been appointed sales manager of the King Motor Car Co. of that city. He succeeds R. B. Bishop, who has been appointed assistant sales manager of the Nash Motors Co., Kenosha, Wis.

L. C. Van Beaver, formerly Overland export manager in Europe, has been appointed as assistant to Harry W. Ford, president of the Saxon Motor Car Corp.

T. H. Fonda has been placed in charge of the office at the general offices in Detroit of the United Motors Service, Inc., which is establishing a system of service stations for Delco, Klaxon and Remy electric systems throughout the country. He was formerly in the service department of the Dayton Engineering Laboratories Co.

H. T. Whittlesey has been appointed factory representative of the E. R. Wagner Manufacturing Co., Milwaukee, Wis. He was formerly in the sales department of the Parish & Bingham Co., Cleveland, O.

The Simplex Automobile Co., New Brunswick, N. J., will cease the manufacture of the Simplex automobile during the period of the war. The company is owned by the Wright-Martin Aircraft Corporation and its facilities will be used in the production of Hispano-Suize motors, which are being manufactured by



H. J. Galvin, Manager of United Motors Service, Inc., New San Francisco Branch.

the latter company.

E. J. Willis Co., New York City, has been placed in a receiver's hands on a petition of the Jay Jay Horn Co., National Novelty Manufacturing Co., and the G. W. Le Compte Co. Assets are said to be about \$50,000 and liabilities \$60,000. Henry Melville is the receiver.

Walter J. Bradt, field sales manager of the A. B. C. Starter Co. of Detroit, died in Portland, Ore., while on a business trip in the Pacific coast territory.

The Shotwell Pump and Tank Co., Indianapolis, Ind., has been placed in the hands of a receiver. James M. Ogden, an attorney of that city, has been named as the receiver.

The Stewart-Warner Speedometer Corp., Chicago, Ill., has paid off \$100,000

of notes since Jan. 1, 1917, and it is understood will probably pay off a like amount later, reducing the outstanding notes payable to \$600,000. It is estimated that the company's earnings for the year ending Dec. 31 next will total nearly 20 per cent. on the common stock after deducting the excess profits tax.

The United Motors Service, Inc., opened its newest branch at San Francisco on September 1st. The branch includes an office and service station equipped to give expert factory service on all Delco, Klaxon, and Remy electrical equipments within the territory served.

Complete stocks of factory parts for every model and make of car which has ever been Delco, Klaxon or Remy equipped will be maintained at the San Francisco Branch which is located at 1433 Bush street in the heart of the city's automobile row. H. J. Galvin who was service manager of the Remy company at San Francisco for three years is in charge of the new branch. An extension of the branch system is being made throughout the country and will eventually be nation wide in its scope.

The securities commission of the State of Michigan has given permission to the Doble-Detroit Steam Car Co. to sell \$2,500,000 worth of common stock, the proceeds to be used for the erection of a plant in Detroit for the manufacture of the Doble steam car. Permission was granted after it had been agreed that the company would pay the General Engineering Co. 15 per cent. of its \$10,000,000 capital for use of the patents and at the same time escrow the stock until six per cent. shall have been paid from the earnings of the company on all stocks issued. Under the original agreement between the Doble-Detroit company and the General Engineering Co., the former was to receive a license to use the Doble steam patents on cars, tractors, etc., for 10 per cent. of the Doble-Detroit capitalization in cash and 10 per cent. in stock.

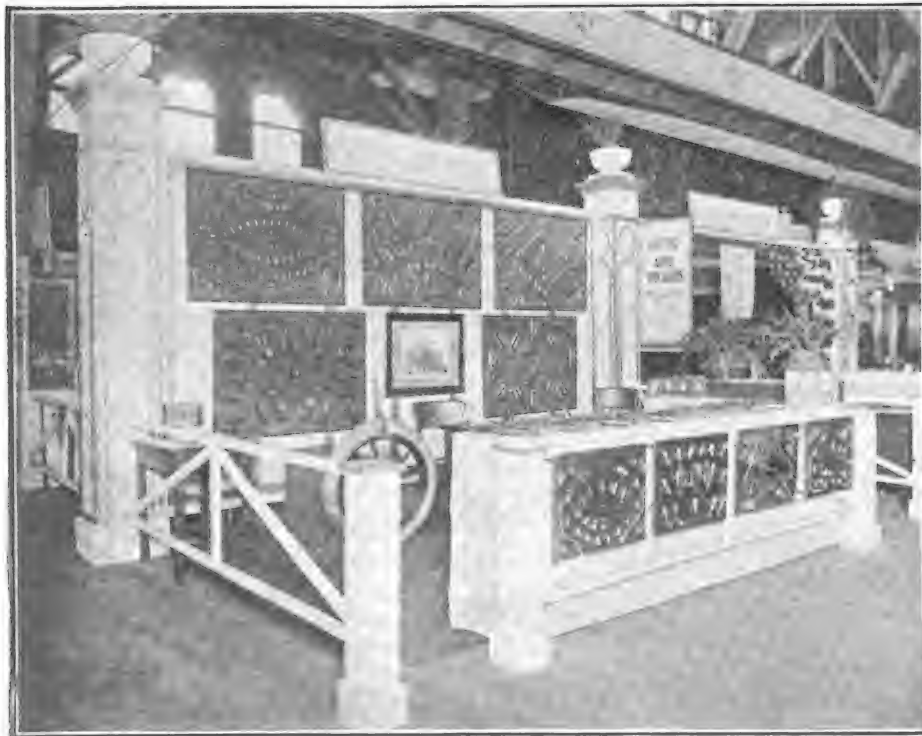
A. B. Walton has resigned as sales manager of the Master Carburetor Corporation. He has announced no plans for the future.

Metal Specialties Co.

Wins Blue Ribbon.

The Metal Specialties Co., maker of the Presto line of automobile accessories, was awarded the Blue Ribbon at the National Exposition for Ford Accessories held in Chicago during the last week in September. This award, the highest given by the exposition, was for the most complete and easily understood exhibit. All articles that bear a relation to each other as to their use were grouped on wooden and plush panels. The cigar lighters and the inspection lamps were exhibited together, as were also the dash and cowl lamps. The electric engine, radiator and carburetor heater were on a panel by themselves and displayed on the counter, as were also the Alweather Protector and Tire Tool.

The company also had the distinction of making the first sale at the exposition, taking an order amounting to \$1000.



Prize Winning Booth at the Recent Ford Accessory Show, the Exhibit of the Metal Specialties Co. of Chicago.

Big Combination of Acetylene Manufacturers.

A plan has been formulated for the consolidation of the Prest-O-Lite Co., Inc., Indianapolis, Ind., the National Carbon Co., Union Carbide Co. and the Linde Air Products. Under the plan as arranged these four companies, together with the Oxy-Acetylene Co., which is controlled by the Union Carbide Co., will be merged into the Union Carbide and Carbon Corp., which will have a capitalization consisting of \$3,000,000 in shares of no par value.

The products of these five companies, mentioned in the consolidation, include storage batteries, acetylene gas torches, lighting carbons and acetylene gas.

The officers of the Union Carbide and Carbon Corp. will be: President, George O. Knapp; vice presidents, Edgar F. Price, M. J. Carney and J. S. Crider; vice president and treasurer, Giles W. Mead; secretary, H. E. Hackenberg. The directorate will be composed of Chairman Myron T. Herrick, Andrew Squire, James Parmalee, C. K. G. Billings, Charles A. Coffin, J. J. Ricks, Nicholas F. Brady, G. W. Davidson, Conrad Hubert, Roger C. Sullivan, F. C. Walcott and James N. Wallace.

Packard Dealers Have \$20,000,000 Investment.

The Packard Motor Car Co., Detroit, Mich., recently compiled some statistics showing the magnitude of its retail distributing organization. The figures were obtained from reports made to the company by its branches, dealers and sub-dealers and do not include the \$36,000,000 investment in the company's plant, materials and machinery.

Packard dealers have a gross investment of over \$20,000,000 and do an annual gross business of over \$70,000,000. Of the total investment \$11,000,000 is represented in buildings alone and of this amount \$8,000,000 represents buildings erected within the last five years. The dealers have \$4,676,000 worth of buildings now in course of erection.

Auto Makers in Big Ordnance.

Several of the officials of the largest automobile manufacturing concerns in the country have formed a corporation in Detroit with \$2,000,000 to engage in the manufacture of ordnance for the government. It is understood that the company has a contract for \$25,000,000 and that Capt. Goodspeed, the government officer, has recommended the purchase of the plant of the Saxon Motor Co. for manufacturing operations.

Among those named as being identified with the new company are: Roy D. Chapin, president of the Hudson Motor Car Co.; Alvin MacAnley, president of the Packard Motor Car Co.; John Trix, president of the American Injector Co.; George Dunham, engineer; W. C. Anderson, president of the Anderson Electric Car Co.; Harry Ford of the Saxon Motor



The Finish at Detroit.

Hyatt Roller Home From 12,000 Mile Trip

The famous Hyatt Roller returned home amid great merry making and festivities. The little Buick car rolled into Detroit at 10:30 a. m. Oct. 5, turning off its 272,963d mile on its original Hyatt roller bearings, which carried it through its bad going and good and served to keep it rolling.

As a fitting conclusion to this most remarkable of all motor car records, the Hyatt Roller was escorted into the Automobile Capitol with bag pipes, a band, floats, reception committee and greeted by Mayor Marx. Later in the day the memorial trip was toasted at a banquet in the Detroit Athletic Club, which was



Little Charles
Slason, Son

and Future
Owner.

The Hyatt Roller at the Big Geyser, Yellowstone Park. Upper Insert, F. E. Slason of Plainville, Kan., Owner of the Buick Car.

Car Co., L. C. Van Beaver of the Saxon company and C. A. Pfeffer, recently secretary of the Chalmers company.

Maxwell Earnings.

The Maxwell Motor Co., for the year ending July 31, 1916, earned \$5,507,697 net after deducting 2 per cent. for the income tax but without any deduction for an excess profits tax. The net working assets of the company and its subsidiaries amount to \$12,280,977. The sales of cars for the year increased 39 per cent. over the sales for the preceding year and contracts have been signed for 32 per cent. more automobiles than had been contracted for at the same time last year.

attended by Mayor Marx, Manager B. G. Koether of the Hyatt Roller Bearing Co., officials of the Buick company and the men who made the 12,000-mile trip around the country in the car on the same bearings with which the car had established a record of 261,800 miles to the satisfaction of competent judges.

The Hyatt Roller is a model 16 Buick, purchased by F. E. Slason in 1909, of Plainville, Kan., and will be given to his son, he says, when the boy becomes a driver. Though, on authenticated records the car had used up some \$8000 worth of tires, while its wheels had turned over many decided to back it for another test. A little more oil on the bearings and it could be started out again, no adjustments required.

Space Drawn for National Automobile Shows

AT A general meeting of the National Automobile Chamber of Commerce held in New York, Oct. 4, which was attended by representatives of over 100 companies, space was allotted to exhibitors for the two great National Automobile shows to be held in New York and Chicago this winter.

Preparations on the part of the management of the shows as well as the exhibitors is being carried out on a larger scale than heretofore attempted and there is every assurance that the exhibitions will even eclipse the success of the famous shows of the past. The number of exhibitors for both cars and accessories is greater than for any previous show and all the space on the four floors of the Grand Central Palace in New York and the Chicago exhibition buildings will be taken. The New York show will be held during the week of January 5-12 and the Chicago show from January 26 to February 2.

Exhibits will be confined to passenger cars and accessories. The Motor and Accessory Manufacturers have applications to allot space to about 100 of its members, and when final allotment of accessory space is made the total will reach close to 300 for each show.

Manufacturers of the following makes of cars, members of the N. A. C. C., were allotted space at the first drawing for both shows: (gasoline) Abbott, Allen, Apperson, Auburn, Austin, Briscoe, Buick, Cadillac, Case, Chalmers, Chandler, Chevrolet, Cole, Columbia, Crow, Davis, Detroit, Dodge, Dorris, Dort, Elgin, Elkhart, Empire, Fiat, Franklin, Grant, Glide, Hackett, Hal, Haynes, Hudson, Hupp, Interstate, Jackson, Jordon, King, Kissel, Kline, Lewis, Lexington, Liberty, Marion-Handley, Marmon, Maxwell, McFarlan, Mercer, Mitchell, Moline, Monroe, Moon, Nash, National, Oakland, Olds, Overland, Owen, Packard, Paige, Paterson, Peerless, Pierce-Arrow, Premier, Regal, Reo, Roamer, Saxon, Scripps, Standard, Stearns, Stephens, Studebaker, Stutz, Velle, Westcott, Willys, and Winton; (electrics) Anderson, Baker, Milburn, Ohio, and Wood. The Glide, Dorris, Hackett and Stephens will be shown at Chicago only, while the Kline will be exhibited at New York only.

Space was allotted to the following

concerns, not members of the N. A. C. C.: American, Harroun, Monitor and Stanley (steam). The American will exhibit at the New York Show only, while the others will be at both shows. Allotment to other non-members will be announced later.

Show Week S. A. E. Meetings.

By arrangements of Meetings Committee of the Society of Automotive Engineers for the Winter meetings of the Society in New York during Automobile Show week and in Chicago during the Chicago show week, the meetings should be of greater importance than previous years.

The New York dinner will be held at Hotel Biltmore, Thursday evening, January 10th. January 10th has been named S. A. E. day for the New York show week. The war dinner of the S. A. E. to be held at Chicago during the Chicago show week will be held at Hotel LaSalle on Friday evening, February 1st. During the day of Friday, February 1st, there will be held a professional session which will largely be devoted to reading of papers on tractor design and other questions relating to the tractor industry.

Kissel Announces Sedanlet.

Sedanlet is the name of a new model announced by the Kissel organization. The cars which bear this catchy title are four and five passenger staggered door models with detachable all-year top, in which all the windows but the rear one may be raised or lowered.

General Motors Declares Dividend.

The General Motors Corp. has declared the regular quarterly dividend of three per cent. on the common stock and 1½ per cent. on the preferred stock, payable Nov. 1 to stockholders of record Oct. 15.

G. A. C. ACCELERATOR FOOT REST.

Every driver of an automobile equipped with a foot accelerator realizes the importance of foot stability as effecting the car movement. With the foot supported upon the heel only, every jolt and jar of the car means a sudden acceleration or retardation of the speed and attendant strain upon the engine. The G. A. C. accelerator foot rest is a device that has been designed to relieve the foot and leg strain by carrying the weight of the foot in a specially designed rest, which is so arranged that the accelerator pedal may

be held in practically any position with a minimum amount of effort. With this device, which is ornamental in effect, unsightly holes in the car matting, as well as shoe wear, is prevented.

Manufactured by The General Appliance Co., 127 Federal St., Boston, Mass. Price \$1.50.

For Standard Electrical Unit.

The Summer meeting of the Automotive Electric Association was held at Fisher's Island, N. Y., September 6th, 7th and 8th and was attended by representatives of every company in the organization. The business sessions were followed by entertainment features including a cruise down Long Island Sound, a carriage drive around the island and a clam bake on Life Saving Beach.

The following resolution was adopted with reference to standardization of electrical equipment on A and B government trucks: "Resolved, that this Association composed of the following manufacturers of starting, lighting and ignition equipment, to wit: Connecticut Telephone & Electric Company, Dayton Engineering Laboratories Company, Dyneto Electric Corporation, Electric Auto Lite Corporation, the Leece-Newville Company, North East Electric Company, Remy Electric Company, the Robins & Myers Company, Splittorf Electrical Company, U. S. Light & Heat Corporation, Wagner Electric Manufacturing Company, desires to co-operate with the Government to the fullest extent in adopting a uniform standard electrical equipment for its class A and B military trucks and will adopt as one of its standards the design which the government engineers may work out."

The following papers were presented: "Why we should standardize business forms and practices," C. O. Miniger; "Patents," Victor S. Beam; "Advertising," J. C. McQuiston.

Edsel Ford's Exemption Claim Turned Down.

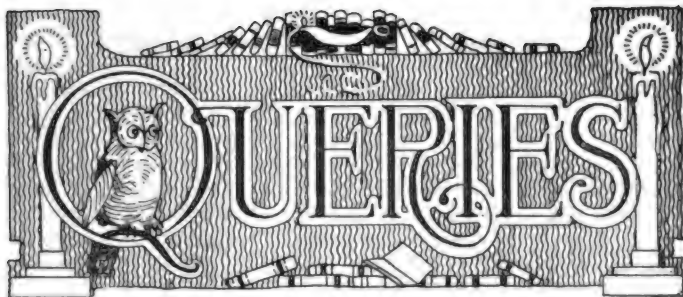
The exemption claim filed by Edsel Ford, son of Henry Ford and secretary of the Ford Motor Co., has not been allowed. He founded his claim for exemption on the grounds that he was engaged in war work, as the Ford Motor Co. was making supplies for the government.

Goodrich Exemptions Light.

The B. F. Goodrich Rubber Co., Akron, O., while employing 25,000 people, a large percentage of which were registered for conscription, asked exemptions for only 17. In these cases the men were vitally necessary to the company in the progress of certain contracts which it is fulfilling for the government. Immunity was granted in each instance by the exemption board.



G. A. C. Accelerator Foot Rest.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT METHODS DO YOU USE TO LOCATE KNOCKS IN THE ENGINE OR TRANSMISSION OF YOUR CAR?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of November. The contest is open to every one.

REMOVING CARBON FROM CYLINDERS.

(C. A. DuBois, Waltham, Mass.)

Before beginning the carbon removing process, the engine should be run until it has warmed up, then through the carburetor air intake, slowly inject about $\frac{1}{2}$ pint of kerosene oil. Run the engine until the kerosene smoke is dissipated. This procedure will loosen up the carbon to a certain extent.

The spark plugs, pet cocks, and valve covers should then be removed and placed in a pan of kerosene. Turn the engine over by the hand crank until the piston in one cylinder is nearly to the top of its stroke, or so that the top edge is flush with the top edge of the cylinder. Care should be observed not to leave the side walls of either the piston or cylinder exposed to the sharp edge of the scraper. The work should be done upon the cylinder which has both valves closed.

Obtain a flexible carbon scraper (from any supply house or repair shop) and bend one end into such a shape that it will reach the top of the explosion chamber. Go over the chamber very carefully with the sharp edge of the scraper and after the carbon has all been loosened do the same with the top of the piston and valves.

The loose carbon should then be collected into a pile and removed with a flat knife or tin. If the knife or tin is dipped in cylinder oil the carbon will adhere to it easily. The balance of the loose carbon may then be removed by blowing air into the cylinder with compressed air hose or tire pump.

Next take a piece of soft cloth, dip it in kerosene and wind it around the scraper. Swab the cloth around in the cylinder and valve pockets to loosen up all remaining carbon. Finally do the same with a dry cloth.

It is essential that the work be done upon the cylinder

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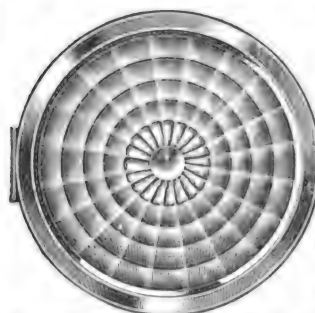
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8¾- 9½ diameter, in inches, per pair	2.25
9¾-10½ diameter, in inches, per pair	2.50
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HEINZE ELECTRIC COMPANY

which has both valves closed or the carbon is apt to work under the valve faces and cause trouble.

With an old tooth brush clean the spark plugs, pet cocks, and valve caps, coat the threads with a paste of graphite and oil and replace them. The graphite and oil makes a tight fitting joint and the removal is easier next time.

After the ignition has been connected the engine may be started and the balance of the carbon will be blown through the exhaust. A leaner adjustment of the carburetor will probably be found necessary.

To keep the engine clean, inject through the carburetor air intake or the pet cocks of each cylinder, once a week after a long trip while the engine is warm, a tablespoonful of kerosene. Turn the engine over a few times with ignition cut off to spread the kerosene.

The next time the engine is started, the carbon that has been loosened by the kerosene is blown through the exhaust. By following this method periodically, a better running and more economical engine is had.

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REMOVING AND KEEPING OUT CARBON.

(H. Weikel, Quakertown, Pa.)
Second Best Letter.

Carbon is the deposit left after low grade gasolines and lubricating oils have been burned in the cylinders with not enough air. As a general rule in practically any engine design the carbon may be scraped from the pistons, explosion chamber and valves with a sharp scraper, which may be obtained from any supply house. Soaking with kerosene for a number of hours, or even days, will facilitate this work, as it will render the carbon softer.

There are a number of carbon removers, both liquid and powder in form, that may be used for this purpose. Another method is to insert a set of scouring rings or chain, which may be obtained from a supply house, and allowing the engine to run on the remaining cylinders for a few minutes.

Carbon may also be removed with a compressed oxygen gas method, carbon burning as it is called, though this method can only be undertaken by an experienced man.

A great cause of carbon trouble is in the lubricating oil supply. Oil should be of a good quality that will stand high temperatures. It must be neither too heavy or too light. When an oil is found that is satisfactory it should be used, and one should not change from one grade of oil to another without sufficient reason. The oil level should be kept at the proper height.

Too rich a gasoline mixture is another cause for carbon deposits and loss of power. Valve setting and timing plays an important part in engine operation. The valve clearance should be kept properly adjusted or the valves will not open far enough, causing back pressure and consequent carbon deposits.

The pistons should be fitted and equipped with properly fitting rings so that the oil will not escape into the explosion chamber. To keep carbon from forming the use of kerosene injected into the carburetor air intake from time to time is recommended.

MORE CARBON TROUBLE.

(S. H. Albany, N. Y.)

For the past month or so my car has been giving me considerable trouble, due to carbon deposits in the cylinders. The trouble seems to be general. By this I mean all cylinders are

effected, so that I doubt if the cylinders are scored. I have installed leak proof rings and had the pistons grooved and bored with drain holes to stop all possible oil leakage, still the trouble persists. Can you give me any advice upon this matter?

That you are not alone in trouble is evidenced by many queries from our subscribers. The carbon evil seems to be increasing rapidly and would seem to be caused directly by the low grade of fuel which is now being used. By low grade is meant low test fuel which approaches kerosene to a certain extent.

When this low test fuel is used vaporization is not as complete as it is with gasoline, the result being that liquid kerosene is introduced into the combustion chambers. This liquid kerosene cuts the lubricating oil and soon finds its way into the base, diluting the lubricant to such an extent that the oil soon becomes thinner and works into the explosion chamber, where it carbonizes. Frequent draining of the oiling system and replacement with new oil is to be recommended for this trouble.

Kerosene or low test fuel is rich in carbon. The proportion of air to vapor when kerosene is used is different than when gasoline is used. For this reason imperfect combustion results and carbon is deposited upon the explosion chamber.

Special manifolds and vaporizing devices now on the market are designed to make the burning of kerosene or low test gasoline possible and nearly all of them make use of the exhaust heat for vaporizing the fuel. The manufacturers claim that less carbon is formed when such devices are used.

Another method of keeping down carbon formation is to introduce a certain amount of water vapor or steam into the cylinders, together with the fuel. Experiments have proved that water vapor will crack off carbon from iron if sufficiently heated.

Either the installation of a special fuel vaporizing attachment or water vaporizing device is to be recommended if one is troubled with carbon. In every case the engine and manifold design plays an important part in satisfactory operation, so that a device which might give good results on one make of car might not work on another type. Before purchasing such equipment the manufacturer should be corresponded with, unless the device is intended for that particular type of car which the prospective buyer owns.

TOO RICH A MIXTURE.

(F. J. M., Albany, N. Y.)

Will you kindly tell me how to remedy a trouble that has been causing me a great deal of bother lately? Every time I try to start my engine, it requires quite a number of trials. I am sometimes obliged to run the starter five or six times, and when the engine is started a great deal of smoke comes from the exhaust for about two minutes. For about that length of time, the engine runs sluggishly and skips. I notice that there seems to be a gasoline leakage at the carburetor as soon as I try to start. After the engine has run for a few minutes, and the smoke has ceased, it runs all right and gives plenty of power. With the engine standing idle the carburetor does not leak.

The leaking of the carburetor of which you write, is really not a true leakage. The gasoline is drawn into the mixing chamber by the suction of the cylinders in excess amounts and is drained from the chamber by a little vent which is made for that purpose.

The reason for the excess gasoline supply is either because the needle valve is opened too far or because there is some obstruction in the auxiliary air inlet tube.

Since you did not tell us the make of your car we cannot give specific directions for the carburetor adjustment. We would suggest that you first try to cut down the gasoline adjustment as low as possible without effecting the running of the engine when throttled down.

If this does not remedy the trouble, inspect the hot air or so called auxiliary air intake line. It sometimes happens that on cars fitted with hot air intakes the small holes become obstructed and the supply of air cut off, causing more



**Uncle Sam Knows the Real Answer
NOT ENOUGH!**

SAVE LEATHER FOR SOLDIERS

To make America's hide supply go as far as possible, hides are being split into five or more thin sheets; but even this saving scheme fails to meet the requirements for soldiers' shoes, harness, equipment, ship upholstery, factory needs, etc., chiefly because too much hide leather is used by the public in places where high grade leather substitutes will serve as well or better.

For instance, the leather upholstery of one average size automobile would make twenty pairs of soldiers' shoes. For years America's largest producers of automobiles have successfully used



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MOTOR QUALITY

for upholstering their cars. Thousands of owners never even knew their cars were not upholstered in leather, because Fabrikoid looks and feels just like the finest leather and actually wears better than the coated split leather most used for upholstery of automobiles not covered with Fabrikoid.

It is true that some few high priced automobiles are still upholstered in genuine grain leather of good quality.

But the pride of possession of luxurious, expensive leather should now yield to patriotic preference for satisfactory substitutes that will divert this leather to more necessary uses.

UNCLE SAM HAS SET THE PACE

The new U. S. motor trucks and ambulances will be upholstered in leather substitutes.

The upholstery specifications for the new Merchant Marine call for "Craftsman Quality Fabrikoid."

What Uncle Sam has found by experience and tests good enough for the Government's severe requirements should be good enough for every loyal American.

If you are a manufacturer using leather, probably part of all of your requirements can be met by some grade of Fabrikoid.

When buying an automobile prefer Fabrikoid upholstery. Help the manufacturer conserve leather by patronizing those who use good leather substitutes like Fabrikoid.

Every hide displaced by a good substitute helps supply our armies with shoes, our farms with harness and our factories with belting—it helps win the war.

Manufacturers! Write us your requirements and let us cooperate with you.

Send for samples and booklet.

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The Accessory and Garage Journal

The National Trade Authority

TIMES BUILDING, PAWTUCKET, R. I.

suction on the needle valve and a consequent oversupply of gasoline.

If your car is fitted with a choke valve in the air intake see that the valve which is usually controlled by a spring, returns to the open position after the engine has started.

Perhaps with your carburetor you do not need to choke off the air to start the engine, and if you have been doing this we would suggest that you try to start the engine with the valve open.

HIS SAXON ENGINE OVERHEATS.

(A. A. D., Bryn Mawr, Pa.)

I am having some trouble with my 1915 Saxon roadster and would like a little advice relative to timing. I find that the engine overheats under ordinary conditions, lacks compression, and seems to whistle when I turn the crank handle over. The cylinders are in good condition and the rings appear to fit perfectly. Can you tell me the reason for the trouble?

Taking into consideration the two facts of which you write; namely a whistling noise, and overheating; it would seem that the engine trouble is due to faulty valves or incorrect valve timing.

After the engine has been run long enough to heat up, stop it and examine the valve clearance. The distance between the valve stem and valve lifter or tappet should be approximately equal to the thickness of a visiting card. If it is more than this, the exhaust valves will not open sufficiently to allow a rapid escape for exhaust gasses and overheating will result. If it is less than this, the valves may be held open at all times resulting in lost compression and overheating.

This distance of clearance should be measured immediately after the valve has closed. Turn the engine over with the hand crank until the first valve at the front of the engine has raised to its uppermost point, then downward until it is free from the tappet, then make the measurement. Do the same to every valve.

The next possibility is in the spring tension. With the engine running at normal speed insert a screw driver between the valve spring coils and give it a slight twist so as to bring tension upon the spring. Should this procedure have an effect upon the running of the engine a new valve spring should be put in. All valve springs should be tried in this manner.

Failing to locate the trouble in either the adjustment or springs, the valve timing should be checked off. If you look on the flywheel you will notice a number of letters, which have reference to the valve positions.

Turn the engine over until the mark Ex. Cl. is on the top and directly beneath the pointer. The exhaust valve in one of the cylinders should be just closing. If this is not the case, the timing gear must be removed from the cam shaft and the camshaft turned in an anti clockwise direction until the exhaust valve in one of the cylinders which has a piston near the top of the stroke is just closed, then the gear should be returned.

To check over this timing, turn the flywheel until the mark In. Op. (Inlet opens) is at the top of the flywheel and under the pointer. The inlet valve in one of the cylinders should start to open. (The piston in this cylinder should be near the top of its stroke.)

The valves should next be inspected and should the faces or seats seem to be pitted, chances are that the leakage is through them. They should be ground into place by the use of grinding paste and a screw driver, taking care not to allow the paste to work into the cylinders or valve guides.

A frequent cause of compression leakage can be traced to spark plugs. The plugs should be coated upon the threads with a paste made of graphite and oil and screwed tightly into the cylinders. The compression union or nut which fastens the porcelain into the plug body should be examined and screwed up tightly.

Compression leakage at gaskets, plugs, etc., may be located by putting oil upon the joints with the engine running and if bubbles arise it is an indication of leakage.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

FILTERING LUBRICATING OIL.

(R. V. McC., Auburn, Me.)

Will you please tell me how to filter oil taken from engine or transmissions so that it may be used again?

If you intend to clean oil in large quantities a strainer such as is shown in the first sketch is recommended. A, is a large size truck funnel or pail, fitted with two gauze screens, m and n, the upper being of slightly coarser mesh than the lower. The funnel is connected by $\frac{1}{4}$ inch brass pipe to the side of the pail B, near to the bottom.

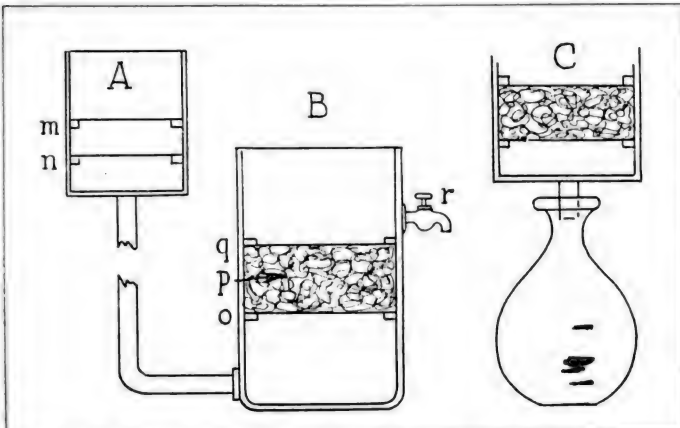
The pail B, is fitted with two fine mesh screens o and q slipped into place in such a manner that they will hold the waste and wool into place as shown at p. The material shown at p should be composed of about half and half mixture of cotton waste well picked apart and steel wool and should be cleaned very frequently.

Immediately above the top screen is fitted a draw off faucet R. The space above the screens should be large enough to hold all of the oil from A.

This device possesses a number of advantages over the regular type, chief of which is the general tendency to clear the screens due to the fact that the heavier particles will drop to the bottom of the pail B without clogging the screens or wool mixture.

The rapidity with which the device will filter depends of course upon the height of A above B, the grade of oil and the thickness of the wool mixture.

If oil is to be filtered in small quantities a funnel arrangement as shown in the second sketch will give good results.



Two Easily Constructed Oil Filters. A. and B, Large Filter. C, Small Filter.

In this type of filter the wool and waste is held between two fine mesh screens. The oil being poured into the top and collected in a jar or bottle at the bottom.

It is not considered good practice to use oil over and over again even after it has been filtered, because after a time it will lose its lubricating properties. For this reason oil that has been filtered is never used in the engine or transmission again, but used around the shop or in places on the car that are not subjected to much heat or friction. Many garages use filtered oil only in the squirt cans and for lathe turning.

Military Test of Highway Transportation.

The War Department proposes to find out definitely how much help it can obtain in transporting men and supplies over the highways instead of by mail. On Oct. 11 six two-ton trucks will leave the post quartermaster's warehouse at Atlanta, Ga., on a 115-mile run to Ft. Oglethorpe, Ga. These trucks will carry loads of supplies needed at their destination. At the same time a special passenger truck will transport 16 soldiers with their guns, ammunition and full field equipment from Ft. McPherson to Ft. Oglethorpe. The journeys will be made under careful observers so that a complete record of the time and cost of the trips will be obtained. This information will not only include the facts relating to the actual runs, but also the time and cost of loading and unloading the supplies, weather and road conditions, and the behavior of the trucks.

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CHAMPION IGNITION CO., Flint, Michigan, U. S. A.

OVERHAULING THE DODGE BROS. CARS.

(Continued from Page 19.)

The camshaft is retained by a pin which fits in a groove cut in the center camshaft bearing. This pin in the older cars was held in place by a set screw, while in later models a spring is used. When the pin is removed, the camshaft may be pulled from the engine.

If the clutch is of the disc type and still remains in the housing the clutch release fork should be removed as directed for the removal of the cone clutch; the clutch assembly may then be slipped from the housing and disassembled.

Disc Clutch Disassembly Described.

The disc clutch assembly is made up as follows: The shaft upon which the discs are assembled is fitted at the front end with a shoulder against which the clutch driven spider rests. This spider is keyed to the shaft, fitted with three driven disc pins upon which the driven plates are carried, and has a smooth face against which the driving plates are clamped when the clutch is engaged.

Alternately on the spider are: first a driving plate which has three holes through which the flywheel driving studs fit, and which is faced upon both sides with wire-woven asbestos fabric; then a smooth driven plate fitting upon the clutch-driven spider pins; the entire assembly ending up with a driving disc. Upon this plate assembly is placed the pressure disc which fits over the driven spider pins, and which carries a long hub with a shoulder on the front inside edge. Inside this hub and resting against the shoulder is the spring, which is held compressed against the shoulder by a clutch spring retainer and a split washer which fits into a groove cut in the clutch shaft. The spring tension is increased or decreased according to the place of location of the split washer upon the shaft and for this adjustment, three grooves are cut in the shaft. To release this pressure it is necessary to pull the pressure disc toward the rear, and for this purpose a ball bearing and clutch releasing housing

which is carried in the clutch release fork, is provided. To disassemble this unit a special tool is provided by the Dodge Brothers factory to compress the spring, remove the split washer and release the spring. If no special tool is at hand, the assembly may be placed in a press, and a piece of pipe used against the clutch spring retainer to compress the spring and proceed as above. For washing the asbestos clutch fabric, turpentine may be used in preference to gasoline because of its penetrative qualities.

Operations on the Transmission.

If the transmission has not already been removed, it should be taken out as directed in the paragraph describing the removal of the engine and transmission as one unit.

The first step in the disassembling of the gearset is the removal of the universal joint. The joint is fastened together by four bolts, when these bolts are removed the joint may be disassembled, and the nut on the end of the driving shaft which fastens the front member of the joint in place exposed; this nut should be removed and the joint member, which is keyed to the shaft, pulled from the shaft. The three screws which fasten the front of the universal housing to the gearset case should then be removed, exposing the ball bearing which may then be driven from the housing.

The sliding gear shaft may then be removed from the housing and the gears and bearings examined. The front ball bearing is held in place by screws and a washer located inside the clutch bell housing, when these screws are removed this bearing may be driven out and examined. In driving out bearings of this type the blows should be struck against the outer race, since it is the outer race which is fastened into the housing.

The countershaft is retained by a screw which is located at the back of the gearset housing. When this screw has been removed, the countershaft may be drawn out, leaving the four gears assembled inside the case, from which they may be lifted out. The two outside gears of the countershaft assembly are keyed and driven on to the reverse and

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low gear casting which rotates upon the countershaft.

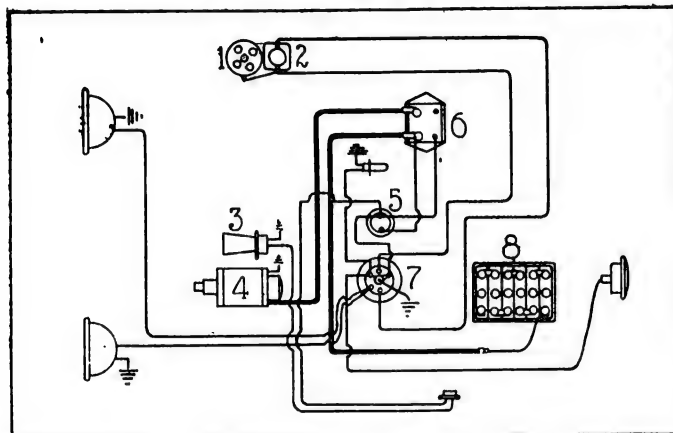
The reverse idler gear is mounted upon a bracket which is located on the left side of the transmission gearset and retained by six screws. When the bracket is removed, the retaining pin may be taken out allowing the gear and shaft to be disassembled.

Rear Axle and Differential.

The rear axle is of the full floating type and may be entirely disassembled without removing the housing from the car. The rear of the car should be jacked up to remove the weight from the wheels and the eight nuts holding the wheel hubs removed. The wheel hubs may then be withdrawn, carrying the driving shafts with them. The differential cover plate is next removed, exposing the differential assembly.

The differential assembly is carried in roller bearings which are held in clamps upon the propeller shaft housing. These clamping brackets are fitted with caps which should be removed, permitting the removal of the differential case with the bearings and races. Four studs and nuts are used for fastening the two differential housings together, when these are removed, the differential may be disassembled. After the differential has been assembled and the brake control rods removed, the cap screws which fasten the drive shaft housing to the rear axle should be taken out and the drive shaft unit pulled from the axle.

To disassemble this unit, the pinion gear must first be removed from the shaft. The gear is keyed and held by a



Starting, Lighting, and Ignition Wiring of the Later Dodge Brothers Cars. 1, Distributor; 2, Ignition Coil; 3, Horn; 4, Motor-Generator; 5, Current Indicator; 6, Starter Switch; 7, Ignition and Lighting Switch; 8, Battery.

nut, and, with the nut removed, may be drawn from the shaft with a wheel puller. With the gear removed, the shaft may be drawn from the front end of the shaft.

Both roller bearings are held in place and adjusted by bearing adjusting rings which may be inspected or unscrewed through a hole in the top of the shaft housing which is fitted with the adjusting ring lock.

It is of the utmost importance that the relative positions of the pinion drive and the driven gear are correctly made, or these gears will wear very rapidly and cause much noise and grinding.

After the drive shaft and differential have been reassembled and the rear axle put into place a careful adjustment should be made as follows:

Adjustment of Driving Unit.

Turn down upon the drive shaft adjusting collars until the edge of the pinion gear teeth are in a line with the backs of the teeth on the master or ring gear. Then turn on the differential adjustments until both gears are meshed, or bottomed against each other with the back edges of the teeth forming a smooth line. With the gears bottomed, the teeth should not overlap each other on the ends. If the adjustment is left this way, the gears will grind, because they are set too tightly together. The drive shaft adjustment should be backed off one or two notches, as should also the

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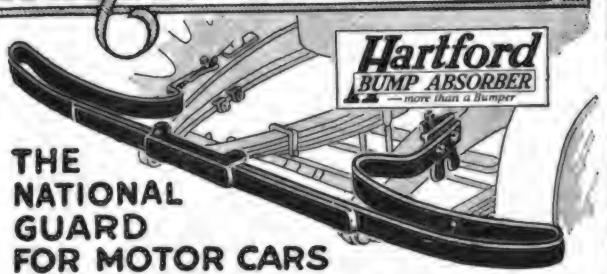


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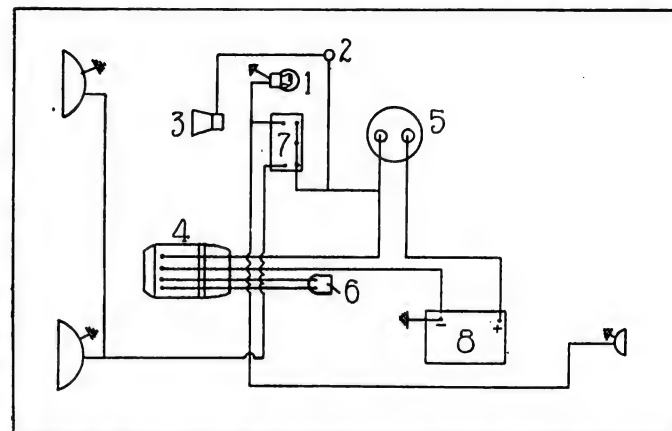
differential adjustment, permitting a clearance between the teeth of between .006 and .009 of an inch. After the adjustment has been made the collars should be locked. There should be no play in either the differential or drive shaft when a proper adjustment has been made.

Two types of steering gears have been used, the older, a sliding block and sector; the later a worm and worm gear. The sliding block type had a coarse worm which was coupled to the steering wheel. Upon the worm was fitted a block having upon its edge teeth, forming a rack. As the steering wheel was twisted, the rack was raised or lowered turning the sector, upon which was mounted the steering arm, thereby cramping the wheels.

The later type is shown in the illustration and consists simply of a worm and wheel. Play or lost motion in both types may be compensated by the tightening of the nut which is located at the top of the housing. In addition to this, lost motion or wear may be remedied in the later type, by the turning of the worm wheel one full quarter of a revolution. Since the worm wheel is seldom used for more than one quarter of its circumference only about one quarter of the teeth are worn at each adjustment, permitting four adjustments before actual replacement is necessary.

Timing and Adjustments.

Before setting the camshaft gears, all the valves and tappets should be adjusted so that the clearance between them is between .003 and .004 of an inch. When this is done, the crankshaft should be turned clockwise until the piston in number one cylinder is 1-16 inch past the top of its



Starting and Lighting Wiring of the Earlier Dodge Brothers Cars. 1, Dash Lamp; 2, Horn Button; 3, Horn; 4, Motor-Generator; 5, Current Indicator; 6, Starter Switch; 7, Ignition and Lighting Switch; 8, Battery. Taken from American Bureau of Engineering Wiring Diagrams.

stroke. The camshaft should then be turned counter-clockwise until the exhaust valve in number one cylinder has just closed, then the gears should be meshed. As a general rule, the timing may be verified by the marks upon the flywheel or marks upon the timing gears.

Before setting the magneto the magneto driving shaft coupling should be disconnected and the spark lever set at full retard. The engine should then be turned until the piston in number one cylinder has reached the top of its stroke and passed over about five degrees. (About $\frac{1}{8}$ inch measured on the circumference of the flywheel.) The exhaust valve of number four cylinder should now be closing. The magneto shaft should next be turned in a clockwise direction (facing the rear of the car) until the distributor brush is under the terminal connected with the spark plug in number one cylinder, then back or forward until the points in the breaker box are just separating. The coupling should then be connected and the timing checked. The cylinders should fire in the following order, 1-2-4-3.

The setting for the Delco unit is similar, though in this case the coupling need not be unfastened, since all of the adjusting may be done by loosening the breaker box cam.

There is but one carburetor adjustment and this is made at the factory. So that beyond the cleaning of this device, no further attention is necessary.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

1917 SALES

FOREIGN BUSINESS \$90,958,243.00

From National Automobile Chamber of Commerce,
7 East 42nd Street, New York, August 27, 1917

Embargoes Affect Motor Car Exports

Thirty-five Per Cent. Decrease in Shipments to Great Britain, France and Russia During Last Fiscal Year—Big Increases to All Other Countries—Shipments Total 80,811 Cars, Valued at \$90,958,243—Thirty-three Hundred More Vehicles Exported, But Aggregate Value is \$6,507,000 Less—Fewer Trucks and More Passenger Cars.

Figures just issued by the Department of Commerce show that, during the 12 months ended June 30, 1917, the United States exported 80,811 automobiles and motor trucks, valued at \$90,958,243, as compared with 77,499 cars, valued at \$97,465,811 during the preceding fiscal year.

Analyzing the official figures, the National Automobile Chamber of Commerce finds that the increase in number of cars exported is due to the larger shipments to most countries outside of Europe, which more than offset the decreases in exports to Great Britain, France and Russia, due to import prohibitions and lack of shipping facilities.

The fact that the aggregate value of exports during the last fiscal year was less by \$6,507,000 than in the preceding year, while the actual number of vehicles exported was greater by 3312, is due to decreased shipments of trucks for war purposes, the average value of which is much higher than the average value of passenger cars exported to countries outside of Europe.

Exports of commercial vehicles and passenger cars during the two years were as follows:

	1916		1917	
	No.	Value	No.	Value
Commercial....	21,265	\$56,805,548	15,977	\$42,337,315
Passenger.....	56,234	40,660,263	64,834	48,620,928

Thus, while the number of trucks exported fell off 5288 in the year and their aggregate value was \$14,468,233 less, the shipments of passenger cars increased by 8600 and their value by \$7,960,665.

Great Britain and France were still our largest markets, despite their heavy falling off in purchases. The former bought \$18,508,442 worth last year, mostly trucks, as against \$26,147,232 worth in the previous fiscal year. France's imports were nearly all trucks and amounted to \$14,691,460, as compared with \$19,137,904 in the 12 months ended June 30, 1916.

Owing to shipping difficulties and internal political

troubles, Russia's imports fell from a value of \$15,686,874 in 1916 to \$6,371,982 in the last fiscal year.

Exports to the rest of Europe combined increased remarkably, when it is remembered that no shipments went to the central empires. The increase amounted to more than \$1,000,000 in the year, accounted for largely by exports to the Scandinavian countries, Holland and Spain. Europe as a whole took slightly less than one-third by valuation of the total American exports.

Aside from the European countries, Canada is America's best customer for motor cars, having increased her purchases by nearly \$4,200,000—from \$7,280,151 in 1916 to \$12,088,787 in 1917.

Next comes Asia and Oceania, with imports of 9716 cars, valued at \$10,093,720 last year—an increase of \$1,450,927. Australia follows, with 5000, valued at \$4,213,874. The British East Indies increased their purchases from \$2,307,739 to \$3,617,351.

In the Americas, after Canada, the West Indies were our best market for automobiles, to the extent of \$4,072,647—an increase of \$1,248,735 over the year before.

The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workingmen.

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VOL. LXIV.

OCTOBER 25, 1917.

NO. 6.



What Is Your Car Tool Equipment?

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The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

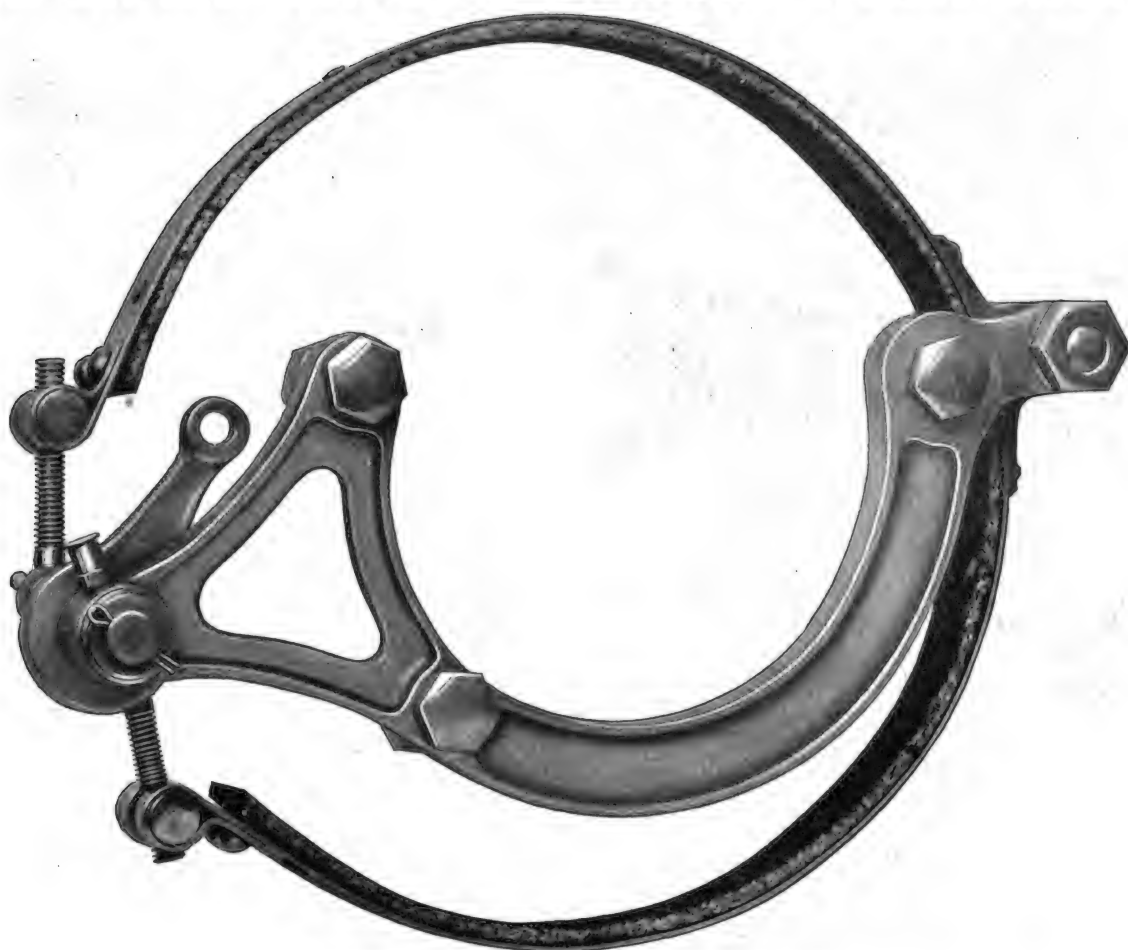
This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workingmen.

If you are a member of the Foreign Trade Bureau conducted by the Automobile Journal Publishing Company you can reach 8,000 foreign buyers of pleasure cars, trucks, fittings, supplies, accessories, tools and equipment in more than 81 foreign countries.

ALL FACTS AT REQUEST

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THE G. H. DYER COMPANY

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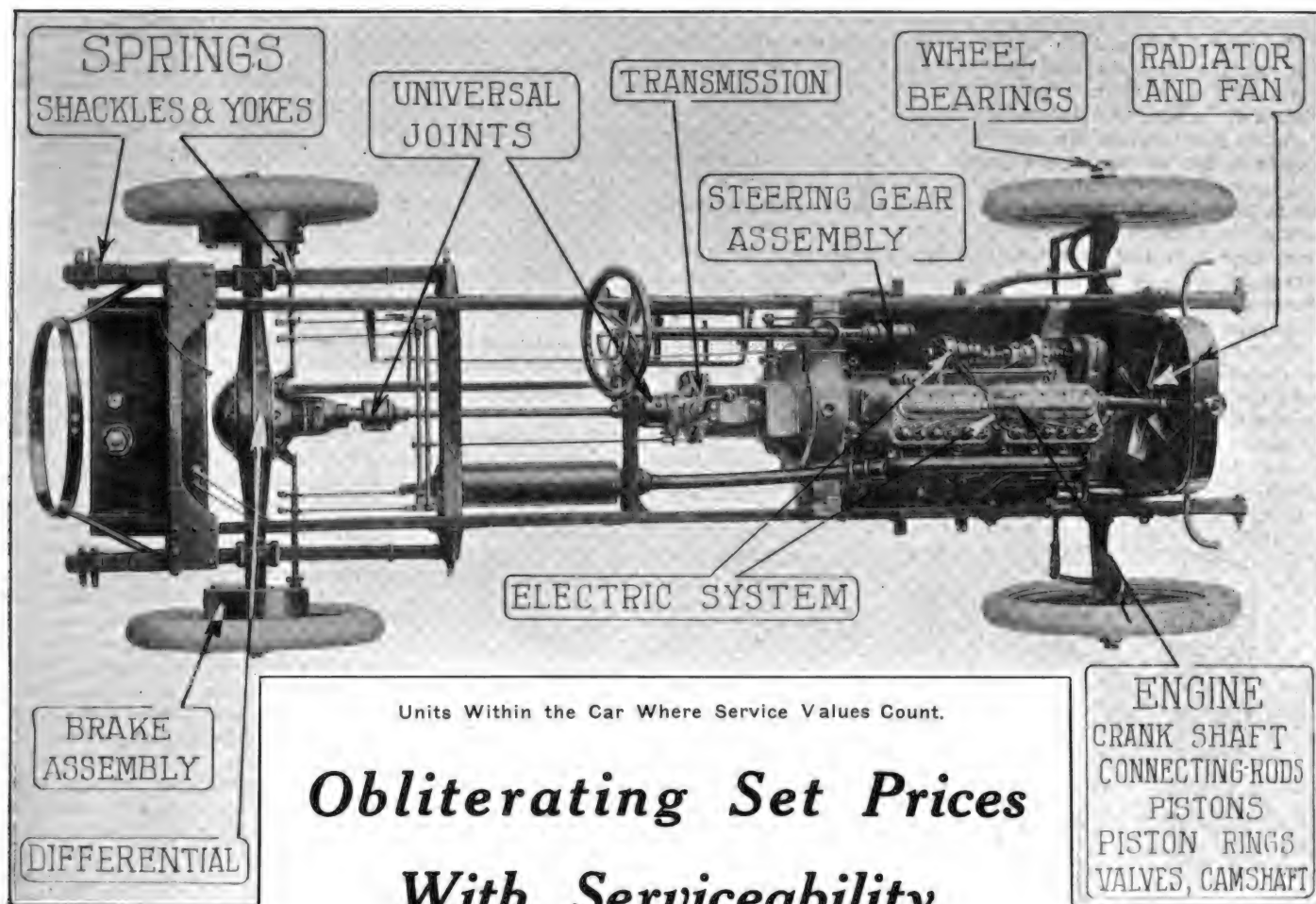
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THE Automobile Journal

VOL. XLIV.

OCTOBER 25, 1917.

NO. 6.



**After All the Car's the Thing, and the Values Built Into It Loom
Bigger Than Graduated Charts That Are Based on the Calendar**

SERVICE values in a car prove themselves superior to challenge every time the intrinsic value of an automobile is in question, and when these are all properly understood they obliterate set prices for used cars. If a well built motor car used initially for passenger service always remained new, if it were always devoted to no other service than touring, or for trips around the city carrying the business man back and forth between his home and his office, the members of his family on shopping expeditions and the children to and from school, there would naturally be but slow demand for new cars. It is not time alone, however, which takes the newness from a motor car. Diverse uses are made of the motor car as wear, time and new utility discoveries made by the owner turns the cycle of its existence. Transportation demand establishes millions of motor cars in the land, and the different changes brought about by time and

usage sends hundreds of thousands of them into the market for resale as used cars while they possess high percentages of value and usefulness. For a material object to lose newness and freshness is no crime, but an immutable law to be reckoned with and business conduct governed accordingly.

The percentage of value in a used car, the Automobile Journal maintains, cannot be determined by any set form, and the number of veterans in the trade who coincide in this opinion is exceedingly surprising. This is a strong point for direct sales in the used car business.

No Advance Condemnsations Wanted.

Another telling point against the proposition of any person, body or publication to fix an advance condemnation price according to the year and model is that all such are compelled to admit that this is beyond the bounds of possibility. It has been established openly that in putting forth a set price schedule it has been

necessary to leave a very wide gap between maximum and minimum and to cap this achievement assert that this sort of an appraisement is only approximate and therefore not reliable. What is that but the frankest kind of admission that the appearance and condition of a car is the sole reliable guide and a card of set prices nothing but a confusion to values? What is this but proof of the assertions repeatedly made in these columns that practical, mechanical tests alone will determine the traveling value that remains in a car after it has had a longer or shorter period of use? With the data secured from such inspection is to be combined the mileage record, the history of the car and the worth of the manufacturer's name it bears in order to arrive at sound valuations. All of these elements demand respect in the automobile trade, especially when used cars enter into such a large percentage of new car sales as they do at present and for some time to come.

Many veteran dealers have tried out systems based on the initial cost of the car, only to find depreciation very elusive to reckon, not only because some cars depreciate much more rapidly than others, but because the rate of depreciation will not follow the decimal system. For instance, a \$2000 car and a \$1000 car will not depreciate respectively \$200 and \$100 in a set period of time, and the trade will say that the cheapest car on the market today depreciates less than any other car. Aside from that two cars of the same year, sold on the same day and coming in for an exchange a year later will be far apart in value, according to the mileage they have gone and the difference in conservation or severe treatment they have had by the drivers and garage men who have had them in charge.

Surplus Service Designed in Cars.

Practically every car manufactured is so designed and constructed that it is good for from 50 to 100 per cent. more service than is ever required to perform. Of course many cars never live out their normal lives, owing either to accident,

their value is often greatly depreciated.

Cars in Various Service Stages.

When a man gets his car new he is usually particular about its use and does not want to mar it in any way. Soon he begins to use it to carry his tools or merchandise about in and finds that he can both use it for business as well as pleasure. Demands of business, which have probably increased through the use of the car, soon require that he remove the tonneau and replace it with an express wagon body. As his delivery or haulage requirements increase he buys a truck forming attachment and transforms his car into a one-ton truck. Several years have elapsed since the car started on this process of evolution and in two years more possibly he trades the outfit in for a new truck. It may and may not have enough service left in it to make it saleable, but if it hasn't the dealer doesn't junk it, but disassembles the parts. The motor finds its way out to Jones' farm and is found there for several years more pumping water, cutting ensilage, or doing other power work. The steering gear, transmission, differentials, axle

Listen to this statement from a man in New York, who has survived the business maelstrom for a score of years:

"I do not differentiate in my business. To dispose of anything that is in my sales rooms or store rooms for sale we apply our utmost sales ability. We, of course, advertise ourselves primarily as distributors of the 'best' car, but as we have to handle from six to eight used cars for every 10 new cars we place, our advertising expenditure for the used cars is almost equal to that expended for publicity on the new machines.

Applying Sales Ability.

"Our salesmen are instructed to look up all the sales points on every car we take in trade and in most cases if called upon can give as good a sales talk on it as though they were selling a new one. We take them in only on a basis where we can add a sufficient selling cost to make this method possible.

"Any other policy would be business suicide. It is a known fact that if second sale cars are to be handled on a business basis, the cost of selling will be as great as that of selling a new one. To handle this merchandise profitably then it must be necessary to treat it with the same attention.

"In order to be successful, as in all business, the dealer must buy right. That means that when he takes a car in trade it must be accepted on an actual intrinsic value. When the dealer does this his goods are half sold. He acquires profit in the car from renovation and repair and makes a fair additional profit on selling costs. The difference in price of the car or sentimental attitude toward it should make no difference in the amount of attention devoted to its sale. As there is less service accommodation with it, the profit to be expected is naturally less than that to be expected on a new car, but it should be so priced as to show nearly as much profit on the investment as that on the regular line handled by the dealer.

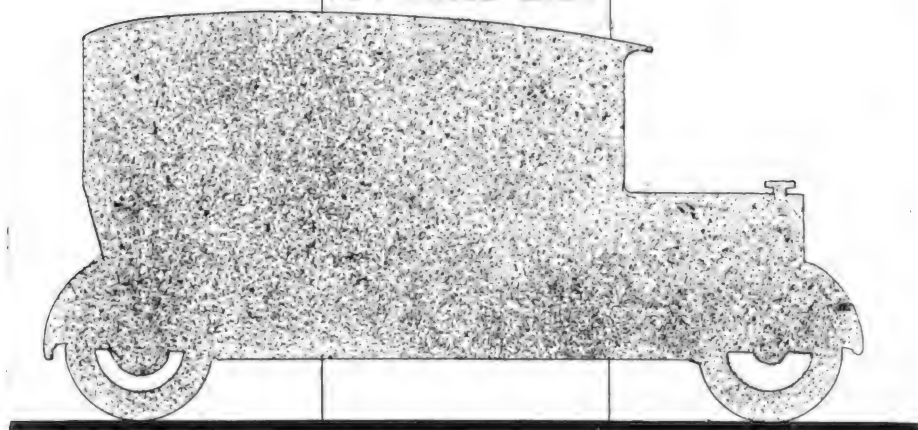
Upholding Remaining Values.

"The salesmen should be familiar with every point of the car and its latent service possibilities. To do this, of course, he must be thoroughly acquainted with the operation of a car, and be able to tell the condition of the motor, brakes, tires and other wearing parts, so that he can estimate the value quickly, and, furthermore, he must be familiar with the 'junking value' of the parts, as in the last analysis this is what the car is actually worth if it cannot be disposed of as a going machine. All the metals in a car now have a high junk value, while many of the parts, of course, can be rebuilt and sold for further use and bring prices that will make the total value of the car almost as much as if it had been sold at its second hand price.

"The day is passed when the used car is cast aside like a dilapidated umbrella. It is never so badly wrecked but what it is worth at least 15 to 20 cents on the dollar.

"Taking all these facts into consideration as establishing the intrinsic commercial value of a car, when the service re-

SET PRICE LIST



The Car Itself Stands in the Foreground, Effectually Wiping Out Calendar Prices.

misuse or carelessness, but with a little care the life and serviceability of a car is far beyond what it is generally supposed to be. Perhaps the most striking illustration of this fact is found in the history of the famous "Hyatt Roller," a model 16 Buick, which in the past eight years has covered over 272,963 miles, which is still running on its original bearings and is good for many thousand more miles of travel. This car, however, did not receive any particular care, as, in the course of its long history it has often been used for work which would call for a much heavier vehicle, has been run under all kinds of road and weather conditions, having recently traveled back and forth across the country without a mishap.

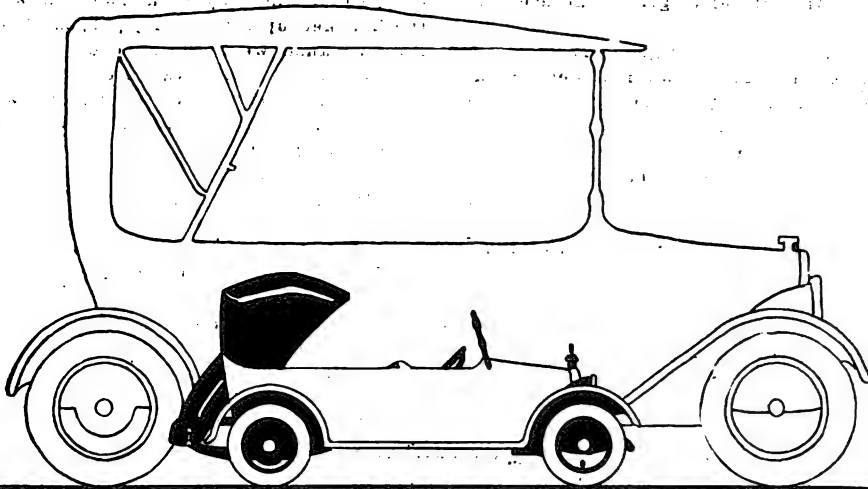
There is no reason in the world why other cars, equally well built, would not duplicate this performance, and, if so, why should a machine be condemned as worthless at the end of 25,000 miles, or one-tenth the distance covered by the "Hyatt Roller?" The service is still in these machines, but on account of an artificially rigged second hand market

assembly and equipment either as a whole or in part find their way to some repair man's garage, where they are used in making replacements and repairs.

Overshadowing the Car Market.

Too often the dealer has looked upon his used cars as secondary stock, which required some sales attention, but no great expenditure of sales effort, overlooking in the meantime the fact that \$10,000 tied up in used cars was just as much capital as \$10,000 tied up in new cars.

He has spent hours, weeks and months framing up a sales policy and methods to dispose of the car for which he is an agent. He studies its superior points, its service value and, in fact, every conceivable sales point that the merchandise lays claim to. Similar study of the used cars he has on hand is equally as essential, as they probably represent as much money invested as his complete line of new cars. Here is the crux of the situation. In the used car department do not hesitate to analyse business and gather the details of its several elements in their true proportion.



There Is No Need to Go On Letting Used Car Business Overshadow New Car Sales.

maining in a usable car is valued and added to the other, nearly every car should be worth at least 40 per cent. of its original cost."

Letting Go of Set Price Guides.

Another, a dealer in the South, abandoned use of the practise of taking 20 per cent per year from the initial cost of the car and also found after trial that a graduated chart could not be relied upon. The faults in these methods developed in the lack of consideration given to the all important elements of demand and serviceability.

Another firm said set price guides, which only give a bewildering high and low value, prove of no value to them, in fact, nothing but a detriment. If one cannot arrive at the value of the car by laboratory methods, coupled with the knowledge he ought to have of car values as a car dealer, there would be little use stopping to make an appraisal at all.

One dealer holds steadfastly to the belief that general appearance is the most important factor to consider in arriving at the value on a used car. This dealer broadly includes in general appearance the service values in vital parts, and he also extends the same rule to his selling points in disposing of the car after it has been dressed up and made fit for turning over to another customer. He says the first impression is a most important one

in the handling of a customer, and that this is especially so with a used car or an overhauled car. Price is not the only feature to interest a prospective purchaser, he says, but maintains that one cumulative value after another must be presented when the man has his attention sharply arrested by an intrinsic merit. Sometimes he finds it necessary to recede from an asking price and does so gracefully on the assumption that the minute an ardent impression cools the dealer can prepare to see the man walk out of the door unsold, and he tries to keep turned away customers down to a minimum.

A sales policy used with success at one place which puts out a large line of

used cars, points out to a prospective purchaser the various features of the different makes, gives the prices and finds out what the purchaser's intention is regarding price. When the salesman has found this out he has a substantial basis from which to work. He knows the reputation of the maker, the reputation the car has earned for service and, if possible, something about the previous owner and the usage the car received. After acquainting the prospect with these points his strong remaining point is that of serviceability.

The average customer banks largely on looks. If the car has retained most of its original lustre, the fact can be dwelt upon for what it is worth, but it is far better for the salesman to keep attention directed on the amount of actual service that the car still possesses. When he hears that it is good for several more years of use at the average rate of operation, either as a passenger car or for commercial purposes, the customer's prejudice against its appearance is largely dissipated. He is also made to realize that he is getting a car for \$500 or \$600 that is just as good as neighbor Jones', which was purchased two years previous and of the same model, for \$1000 or \$1200. He learns that it will not cost a cent more to operate than Jones' car and that it will go as far and as fast.

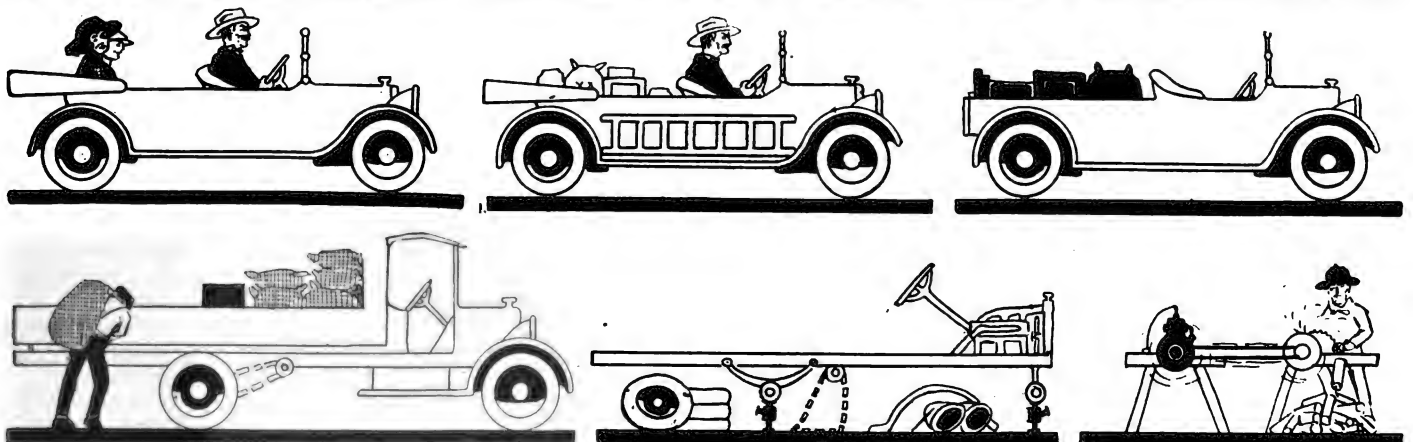
When a thoroughly sound sales argument of this type is built up and used in disposing of the used car, some of the pitfalls dug for motorists and the trade by set price systems may be avoided.

Joins Issue Against Set Prices

Western Motor Journal Advocates Traveling Values on Used Cars Instead of Advanced Condemnation Prices

OUT in Kansas City, where Theodore Roosevelt has been working as a newspaper man, where the breezes of Kansas whistle around the river bluffs and whisk their way from the Kaw valley into Missouri, there is a well grounded opinion that the owner of a motor car

should receive a fair value for his used car when he desires to turn it in and get a new one. Just how strongly this opinion takes hold in one of the best towns west of the Mississippi is told in a late issue of Motorview, speaking appreciatively of the opposition of the Auto-



Progress of a Car Through Five Stages of Service from Newness to Disassembly: The Pleasure Ride, the Carrier, More Carrying, Converted, Taken Apart—The Motor Still Working.

Automobile Journal to set prices as grossly unfair and detrimental to the industry.

We quote from the Motorview's article the following:

There is no just ground on which the owner of a motor car, who desires to exchange it as part of the cost of a new one, should not receive a fair value. Too frequently, however, he is mulcted in the barter, owing to some unjust aspects of the "Used Car Problem," as it has been termed.

There seems to be a disposition among a clique of dealers (not confined to any town or territory) to fix an advance condemnation price on used cars, not based upon the actual traveling value that may remain therein, but upon the year of manufacture. This is an unfair discrimination, in which both the seller of the car and its repurchaser are sufferers.

Certainly there is an appreciable depreciation of any car—some more than others, according to the character of ownership—and the age of the model can justly be regarded as affecting value on resale, but the latter feature is given quite too much weight on many occasions.

The dealer who is in the market for used cars, or who is willing to accept a proportion of them in exchange for later models, is not at the disadvantage in finding a market for them that is often represented. He has had more or less experience in handling cars, is familiar with his territory and its people, and can almost invariably spot a prospective purchaser who, while not able to buy a new car, has the auto bug sufficiently developed to be ready to snap up a "used car" bargain. There is, perhaps, no dealer in the business who has not a prospect list of that kind on file.

Motorview has more than once referred to the fixing of a stated price for used cars, according to the year of vintage, rather than the actual service value remaining in them, as being grossly unfair to the owner, unbusiness like on the part of the dealer and ultimately an injury to the manufacturers—as the ultimate conclusion would be drawn that if one or two years of use "scrapped" them for exchange value, they must have been inferior in stable value at the outset.

This used car problem is being widely discussed in the East. Among the vigorous advocates of a squarer deal for the owner who wishes to realize a fair value on his old car when buying a new one is the Automobile Journal of Pawtucket, R. I. It asserts strongly that in the present state of the trade more attention must be

paid to the matter of giving the used car a chance.

The Journal gets right down to the heart of the subject when it decries the folly of "knocking" a used car, which is the ultimate outcome of placing a standardized low value upon such cars, because it gives the idea that there are not stable values in such machines, if a couple of years use forces a depreciation of 50 or 60% when offered in exchange.

DEALER BANS EXPERIMENTS AND MARKED-UP TRADES.

Mr. Fisher, president of the Union Motor Car Co., Memphis, Tenn., recently

compete in the way of allowances with the 'marked up for trading purposes' fellow; because we know he can and will give you a better allowance than we can for your used car; however, no one will give you a better bargain than we will. If you are going to insist on 'value' we can take care of you, but if you go shopping for the largest allowance we cannot interest you."

THE LOVE OF THE OLD CAR.

Walt Mason, famous Kansas bard, who has won renown by his amazing success in twisting mere prose into poetry, has burst forth in song again about the Haynes automobile. "An Old Car" is his theme and it is in this wise that he writes:

I gazed upon an ancient Haynes, all scarred and marred with travel stains. I gazed upon its ancient form, which had survived the stress and storm of endless roads and changing climes, this boat so much behind the times.

I asked the cheerful owner why he didn't loosen up and buy a modern car and he replied, "I couldn't beat this if I tried. For seven years this good old car has hit the highways near and far. For seven years it's climbed the hills and gamboled by the babbling rills, and pushed its way through mud and sand, and earned its keep, to beat the band.

"I'm always saying, 'Well, next spring I'll get a modern car, by jing.' But when the gentle spring has come and winter's voice at last is dumb, this good old car works so serene and drinks so little gasoline, and is so faithful and so true, I wouldn't swap for one that's new. She's run a hundred thousand miles, and, though away behind the styles, she's sound and husky as of yore; she'll run a hundred thousand more."

I'm not a bloated millionaire; I haven't got the coin to spare to buy a car each passing year, whenever fashions new appear. I cannot buy up motor cars as freely as I'd buy cigars. The auto that I buy today will have to last me till I'm gray, and so I want one built to bear long years of constant use and wear.

There are a million folks like me and with my words they will agree. They're looking for a car to last until life's fitful dream is past.—Haynes Magazine.

The Shotwell Pump and Tank Co., Indianapolis, Ind., which was recently placed in the hands of a receiver, has been declared solvent and the receivership discharged.



SIX GOVERNORS AT MULTNOMAH FALLS.

A famous good roads accomplishment in the West is the Columbia River Highway. During the recent conferences of state governors in Portland, Ore., the chief executives of six western states, as guests of the White Company's Portland Branch, made a trip of inspection over this great motor route in a White 16-Valve-Four. The states represented were: Utah, Governor Bamberger; Oregon, Governor Withycomb; Washington, Governor Lister; Montana, Governor Stewart; Nevada, Governor Boyle, and Idaho, Governor Alexander.

made the following statement, which is in decided contrast to many automobile claims:

"No, we do not handle any 'experiments,' and we do not handle any cars that have been 'marked up' at the factory for trading purposes. If you were 'sold' on one of our cars we will make you a sensible allowance on your used car, but we do not, and will not try to

FIRST DELIVERY OF STANDARDIZED WAR TRUCK

Detailed Description of the Type B Built for the American Army—Industry's Notable Achievement in Its Largest Undertaking

SECRETARY OF WAR BAKER, representing the national government and speaking in behalf of the Quartermaster's Department of the United States Army at Washington, Oct. 19, received from the schedule committee of the Automotive Products Section of the War Industries Board the first two trucks built to specifications and a design specially prepared for the service of the American army by the Society of Automotive Engineers. The delivery was marked by brief formalities and later in the day the trucks were driven to the White House for exhibition to President Wilson, to whom mechanical explanation was made by H. L. Horning, chairman of the Automotive Products Section.

The trucks are the first of a series of 10,000 to be built to a single design, and this production will be the largest undertaking by the automobile vehicle industry. Realizing the great economy of time, men and money through standardization and interchangeability of parts, the War Department sought the automotive industry and proposed that it cooperate in designing and building trucks for use abroad.

Conferences were held and the design for the class B truck was broadly determined. Engineers representing the specialists of the industry, working in harmony, perfected the details of the different units and the entire assembly and a large force of draftsmen rushed the engineering to completion. The designing was begun early in August, more than 50 engineers engaging in it, under the direction of Capt. W. M. Britton. Groups concentrated on the engine, the transmission gearset, the axles and the chassis.

In constructing the design nothing experimental was approved, the purpose being to produce what would afford practical and satisfactory results as measured by the most dependable existing types, with such modifications or changes as would appear to be desirable in the light of experience and the service for which the machines were intended. The units are composite in design, embodying qualities that may be exclusive with various manufacturers, for the engineers worked without restrictions. Considering the engine, the cylinders from characteristics may be said to be Waukesha, the crank case Continental, the pistons Hercules, the timing gearset a combination of Buda, Wisconsin and Continental; the oiling system a combination of Buda and Wisconsin, the governor a combination of Waukesha and Kelly-Springfield, and so on through the different parts. This policy of combining designs obtains throughout the entire chassis.

Upon completion of the drawings they were sent to different manufacturers for manufacture and assembly, no less than 12 truck builders and 62 parts or unit makers producing the units. The engines were built at the plants of the Continental Motors Corporation, Detroit, and Waukesha Motor Co., Waukesha, Wis., both of which made some of the parts. The crank case patterns and first castings were pro-

duced by the Werra Aluminum Casting Co. in five days, the patterns for the cylinder units were made by the Continental Motors Corporation in slightly more than five days, the dies for the crankshaft were sunk in seven days by the Park Drop Forge Works with three shifts working continuously. The Continental company produced the cylinder units, timing gearset case covers, pumps, bushings, etc.; the Waukesha company the cylinder heads, the upper crank case sections, intake and exhaust manifolds, roller valve tappets, etc., and the Wisconsin Motors and Manufacturing Co., Milwaukee, Wis., the crank case lower sections. The Continental company received drawings Sept. 9 and had an engine in test in 19 days and 18 hours. The Waukesha company did the same in 11 days 7½ hours. These companies did not make all the patterns for the castings or the dies for the forgings, but did most of the machining and other work incidental to assembling.

Fast Time Made in Producing Parts.

What has been stated of the engine building obtains with reference to the transmission gearset, the axles and other chassis components, and the parts were produced often ahead of the times specified. The engines were delivered Sept. 30,

on the day set, and these and the other units were assembled at Lima, O., and Rochester, N. Y., where the completed chassis were in readiness for delivery Oct. 7, three days earlier than expected. The trucks were then driven by road to Washington.

The completed chassis weigh about 8000 pounds, and with bodies will weigh close to 10,000 pounds, although these weights may be reduced slightly. The engine weighs 1092



Class B War Truck, Designed and Produced by the Automobile Industry, Rated at 6000 Pounds Load Capacity, with Standard Service Body.

pounds, the rear axle 1592 pounds with wheel hubs and brake drums, the front axle 352 pounds, the transmission gearset 233 pounds, the clutch 103 pounds, the frame without castings 653 pounds, the front springs 148 pounds, the rear springs 544 pounds, the total of the units stated being 4637 pounds.

Details of the Model B Truck.

The model B truck is a two-wheel driven worm shaft and worm wheel rear axle type with a four-cylinder, four-cycle, water cooled, L head vertical engine, with an independent four forward speed ratio transmission gearset. While built heavier than the majority of 10,000-pound trucks, it is rated at 6000 pounds load capacity, so that with normal service load it will have a very large factor of safety for each unit. There are no radius rods, the Hotchkiss system of driving being followed. The semi-elliptic springs are nearly flat and the spring hangers contain oil pockets from which lubricant is fed by wicks to the spring eyes and bolts. The front fenders are very short with flat tops, and instead of running boards forged steel loops serve as steps. On the front end of the chassis is a heavy bumper installed on helical springs. The frame end extends considerably beyond the radiator and on this is a heavy grid that further protects against damage

to the cooling system. On the rear end a wide wood buffer is fitted on brackets that stiffens the frame and takes impact should another vehicle strike it behind. At the corners of the frame are large towing hooks. The service gasoline tank, 15 gallons capacity, with outside sediment trap and drain cock, is mounted inside the dash, and under the driver's seat is a reserve tank of 16 gallons capacity, from which the service tank can be replenished when emptied. The engine is equipped with two independent ignition systems and a generator for charging a battery from which one of the ignition circuits and the lamps are supplied. A starting motor can be installed, the engine being adapted for this equipment. All wearing surfaces are large area, and provision has been made to thoroughly lubricate those in frictional contact. The construction throughout has been with a view of affording the fullest protection, and all units are unusually accessible.

Power Unit and Governed Chassis.

The engine cylinders have bore of $4\frac{1}{4}$ inches, stroke of six inches, piston displacement of 424 cubic inches, and the rating by the S. A. E. formula is 36.10 horsepower, but tests have shown approximately 58 horsepower at 1350 revolutions a minute, which is probably the maximum that the engine will be driven in service, as the chassis is governed to 12 miles an hour. Obviously the power is very large for the freight rating of the truck.

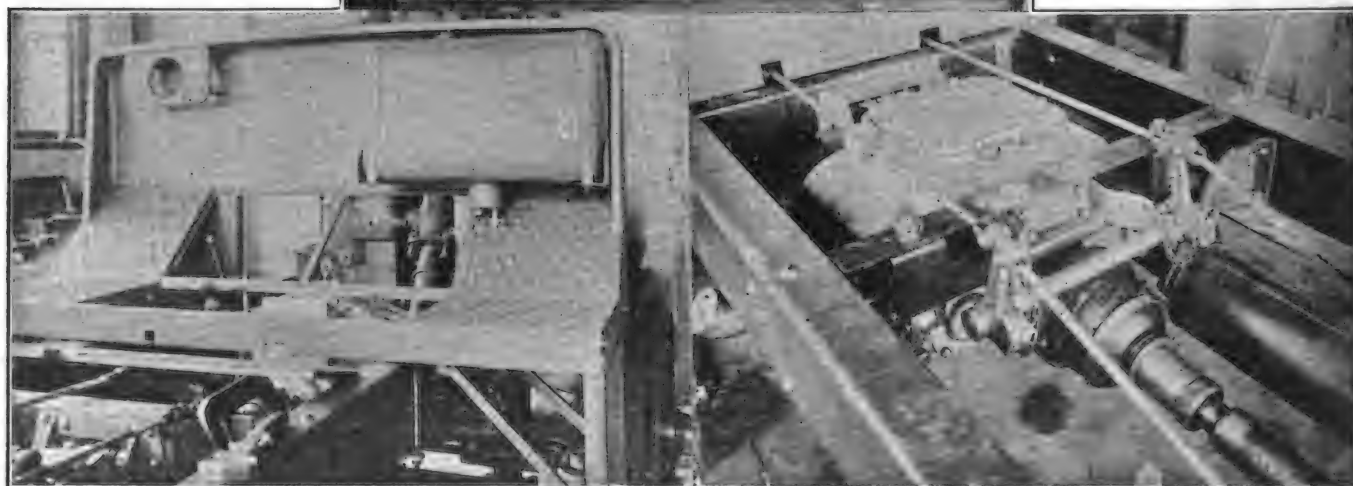
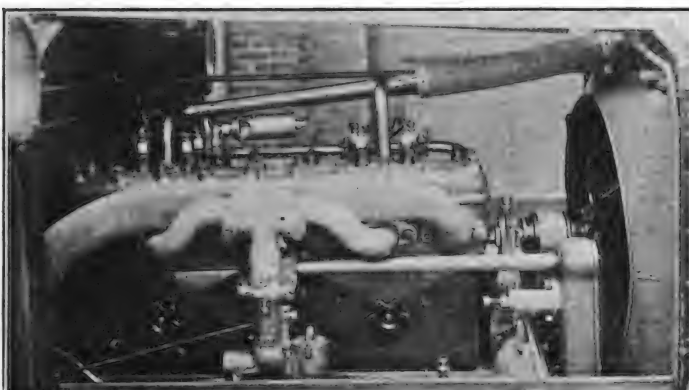
The cylinder units are cast in pairs from a high grade of gray iron, with water jackets integral, the cylinder walls being $5/16$ inch

as the cylinders and are $6\frac{1}{8}$ inches long. They are turned for three compression rings with clearance of $10/1000$ inch at the top and over the upper ring, and $4/1000$ for the bottom ring and the skirt. The wristpin centre is $2\frac{1}{2}$ inches from the bottom of the piston.

Details of Crank Case Sections.

The crank case is aluminum, cast in two sections, the upper half having a heavy transverse web to carry the centre bearing. The lower section is shallow forward to have axle clearance, the rear end being the oil reservoir. Forward and rear extensions form the housings for the timing gearsets and the flywheel, the clutch housing being bolted to the engine case. The forward support is a spigot on the end cover that is turned and is retained by a swivel collar on a dropped frame cross member. The rear supports are deep arms integral with the housing, so formed that there is a complete arch construction from the top of the housing to the tips of the arms. This greatly strengthens the structure. With this suspension there is sufficient flexibility provided in the compartment members to resist all chassis distortion stresses.

The crankshaft is a three-journal type, forged from nickel steel with the flywheel flange integral. It is $2\frac{1}{2}$ inches diameter at the journals and $2\frac{1}{4}$ at the crankpins. The front journal is $3\frac{1}{16}$ inches length and the centre and rear journals four inches length, a total of $11\frac{1}{16}$ inches. The crankpins are three inches length. The webs are $3\frac{3}{4}$ inches wide and $1\frac{1}{4}$ inches thick. The

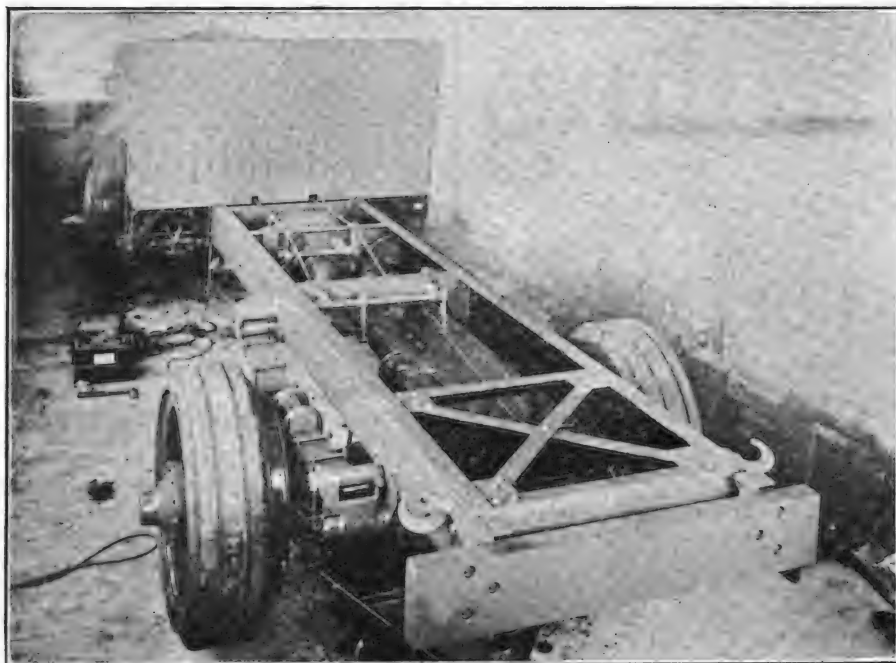


Mechanism of War Truck: Upper Illustration Shows Right Side of Engine, with Special Construction of the Exhaust and Intake Manifold, the Governor Drive, the Clean Water Outlet Manifold and the Radiator Rear Shroud; Left, Dash and Gasoline Tank, with Rear of Engine, Clutch and Transmission Gearset Shown Readily Accessible Under the Footboard; Right, Suspension of Transmission Gearset and Brake Linkage Connections.

thick. The water chambers surround each cylinder and valve seat. The heads of the same material are detachable and contain the entire combustion heads, each head having two spark plug holes in the centre with water chambers between them. The water passages are very large and formed to obtain free circulation. The valve ends are at the right sides of the blocks and under these webs extend to the base flanges to enclose the valve operating mechanism. The base flanges are $\frac{1}{2}$ inch thick, with bosses one inch thick for the hold down studs. The flanges of the water inlets at the left sides of the blocks are $1\frac{3}{16}$ inch diameter, and the water outlet manifold flanges are the same size. The cylinder units are faced flat and the valves project slightly above the tops when seated. The cylinder heads are each retained by $13\frac{1}{2}$ -inch studs, and the units are secured to the crank case by seven $\frac{3}{4}$ -inch studs. The pistons are cast from the same material

shaft is so proportioned that straight oil channels can be drilled from the journals to the crankpins. The connecting rods are I section steel drop forgings. The camshaft is drop forged with the cams integral. The bearings are $2\frac{1}{4}$, $2\frac{1}{2}$ and two inches diameter from front to rear, and in the same order are $2\frac{1}{4}$, $1\frac{3}{4}$ and $1\frac{1}{2}$ inches length. A skew gear back of the rear bearing drives the oil pump. The gear thrust is taken by a spring backed hard steel plunger seated in a socket in the timing gearset cover.

The timing gearset is four gears, one on the crankshaft, the camshaft and generator gears at the right and the water pump gear at the left. The governor motion attaches to the front end of the camshaft. The valve ports are $2\frac{1}{4}$ inches diameter, this size being maintained in the exhaust ports, but the intake ports are restricted to $1\frac{11}{16}$ inches at the manifold. The manifold system is designed for heavy fuels. At



Stripped Chassis of Class B War Truck, Showing Heavy Reinforced Frame, Flat Springs, Large Hangers, Brake Linkage and Transmission Gearset Suspension.

the centre of the exhaust manifold is a rectangular opening. The intake ports are lower than the exhaust ports, so that the intake flanges can be attached. There is a rectangular face in the intake manifold which seats into the opening in the exhaust manifold, and the intake at this point has a box form. When running the exhaust gases play on this box and heat the gas in the manifold.

Valves, Actuation and Guides.

The valves are tungsten steel and are fitted in renewable guides. They are actuated by 60-pound springs. The valve tappets are a sleeve and roller type, carried in guides seated in the base flanges and retained in pairs by studs and dog clamps. They are adjustable with screws and lock nuts. The exhaust valves close five degrees after top centre and open 45 degrees before bottom centre, being open 230 degrees, and the inlet valves open 12 degrees after top centre and close 35 degrees after bottom centre, being open 213 degrees. The flywheel is 20 inches diameter, with four-inch face, and weighs 130 pounds.

At the right side of the engine are the intake and exhaust manifolds, the carburetor and generator, and at the left side the water pump, magneto and the battery ignition distributor, the last being driven by a skew gear off the water pump shaft. The location of the magneto and timer makes for easy linking of the magneto and timer advance controls, and all

of the wiring is on one side of the engine. The water pump is so constructed that it may be removed without dismantling the drive shaft and the timing gearset case.

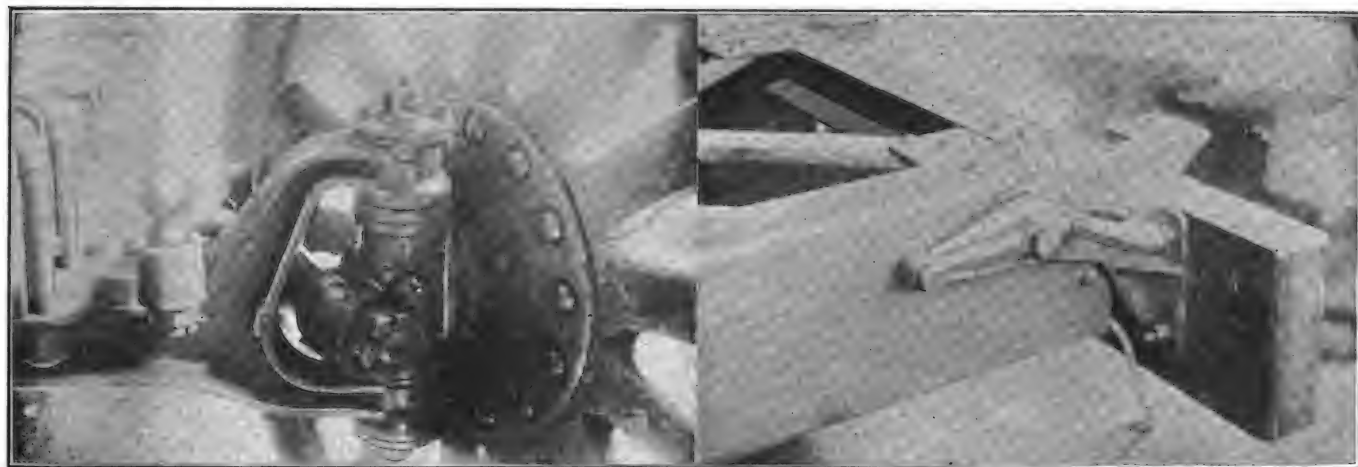
The governor consists of steel balls between a disc that is slidable forward against a spring and a female cone fixed to the front end of the camshaft. The disc bears upon the short end of a vertical lever arm, the upper end of which is linked to a throttle in the intake manifold just above the carburetor flange. The lever is fully enclosed and the spring that pushes against the centrifugal action of the balls is set in a case half way up the lever. Here is a threaded plunger with a lock nut by which the pressure of the spring is set, and both the pin and the lock are secured when set by a sealed wire. The throttle, operated by the governor, is a butterfly type, but the speed is set a little off centre so that the suction of the engine tends to open it, this making for quick reopening and preventing sluggish action.

The lubrication is by pressure. The vertical oil pump is at the right of the rear end of the reservoir. It is driven by a gear and the coupling is a short coil spring with the ends bent diametrically across the coil. The drive and pump shaft ends are slotted and the ends nearly meet, the bent coil ends seating in the slots. With this construction the oil reservoir and pump can be removed and replaced with minimum labor.

The engine is cooled by a forced circulation of water through engine and a very heavy radiator, with cast top and bottom tanks, and a fan in a metal shroud back of radiator.

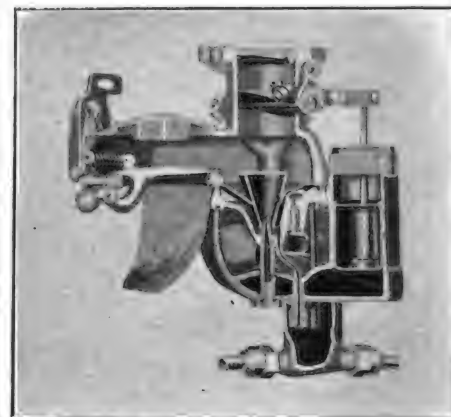
The clutch is a 16-plate dry disc type that is coupled to the transmission gearset by a short shaft having universal joints. The clutch has a very large throwout bearing. The transmission gearset shafts are in the same horizontal plane and the heavy shafts and gears are on annular ball bearings. There is provision for a power takeoff. The case is mounted at the front end on a "nose" that floats in a cap, and at the rear on two points, provision being made for quickly dismounting it if necessary. The drive is by a tubular shaft with universal joints at either end. The full floating type rear axle has a pressed steel housing and roller bearings throughout. Both sets of brakes are internal expanding in drums on the rear wheel.

The worm and worm wheel type steering type steering gear is at the left side. The frame is pressed steel channel section, strongly reinforced. The wheels are wood, artillery type, and the wheelbase is 160 inches.



Class B War Truck Construction Details: Left, Yoke and Pivot of a Front Axle Steering Knuckle; Right, Sturdy Reinforcement Plates, Rear Corner of the Chassis Frame, Bracket Carrying Wood Buffer and Towing Hook.

Overhauling *The* Automobile



Section of Cadillac Carburetor.

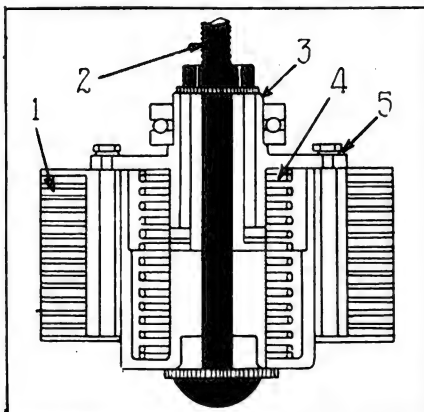
CADILLAC CAR

This is the eighth of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The ninth article of this series will appear in the Nov. 10th issue of the Automobile Journal.

THE mechanical construction of the Cadillac type 51, built in 1915; type 53-1916, type 55-1917, and the latest type 57, announced for 1918, is practically the same. There have been a few minor changes in sizes, number of clutch plates, etc., but what is true of one type as regards disassembling and replacement is true of all.

For an eight-cylinder V type engine the Cadillac engine is very accessible. Minor operations, such as cleaning out carbon, grinding the valves and cleaning the water jackets, can be accomplished with but few disconnections and removals.

Drain the water from the cooling system by removing the drain plugs from the pump covers and opening the drain cocks in the cylinder blocks. Then turn the shafts which extend from the thermostat housings on the pumps until the indicators on the end of each shaft point directly down, this will open the valves and allow the water to drain from the engine blocks. The hose connections should then be disconnected from the engine, the radiator unbolted and removed giving access to the front of the engine.



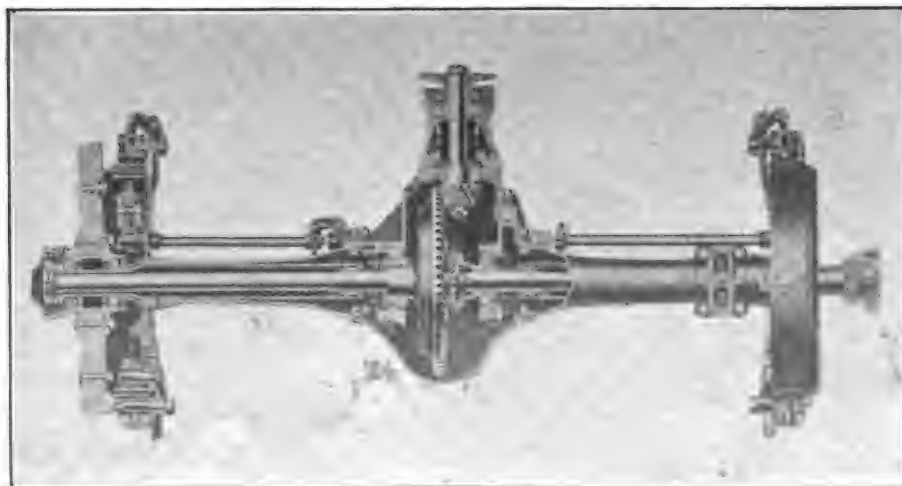
Illustrating Method for Removing Clutch Plates: 1, Discs; 2, Long Bolt; 3, Spider; 4, Spring; 5, Front Plate Stud.

cap over the split
In grinding the

valves the greatest of care should be used so as not to allow grinding paste to enter either the cylinders or valve guides. A piece of waste or cotton cloth, with a piece of string tied to it should be stuffed into the valve chamber while the valve is being ground.

A careful examination of the valve guides should be made while the valves are being ground, and should there be signs of leakage or play between the guide and valve stem, the bushings should be replaced with new.

The cooling fan, which is held to the generator drive shaft by a castellated nut and two keys, should next be removed, exposing the front part of the engine. Screwed on to each cylinder block by nine cap screws are two cover plates at the front, and two corresponding plates at the rear. These plates should be removed and with a stiff wire the water jackets should be thoroughly scraped



Section of Rear Axle, Later Models.

free from sediment and rust.

The drain plug should next be removed from the carburetor and the gasoline drained from the float chamber and pipe line. By doing this the pressure in the tank forces considerable gasoline into the carburetor rapidly, having a tendency to clean out the supply line. The gasoline thus drained may be caught in a pail and after being strained through chamois returned to the tank.

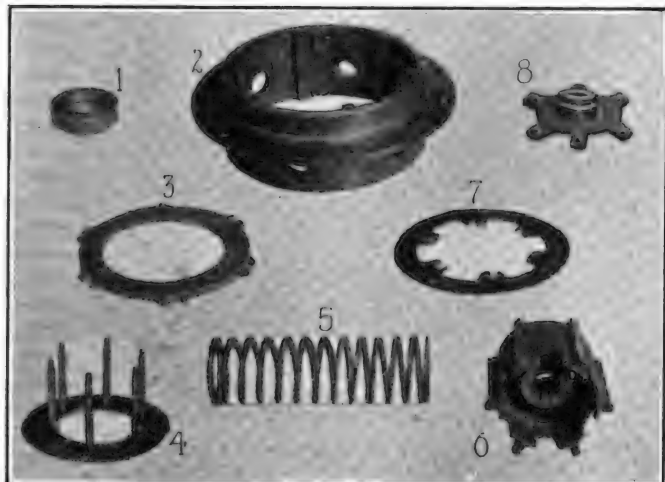
Carburetor and Manifold Removed.

The gasoline supply pipe is next disconnected, then the throttle controls. The four tubes which carry the water to the water jacketed intake manifold are then disconnected and the cap screws which fasten the manifold to the blocks removed. The carburetor and manifold may then be removed from the engine.

On type 51 car the tire pump is bolted to the fan bearing housing and should be unbolted and lifted off. On the later models the tire pump is located on the transmission.

The shaft which drives the generator is coupled to the fan drive shaft and generator shaft. The two couplings should be disconnected and the coupling part which is held by a key and nut to the fan drive shaft pulled off.

The timer distributor on the later models is bolted to the rear of the fan shaft housing and should be unbolted and removed, permitting the removal of the rear fan shaft bearing. On type 51 the rear bearing retainer is held on by six studs and nuts, this should be taken off and the bearing removed.



Clutch Components: 1, Clutch Release Bearing; 2, Clutch Driver; 3, Drive Disc; 4, Front Plate Retainer with Studs; 5, Clutch Spring; 6, Driver for Driven Discs; 7, Driven Disc; 8, Spider.

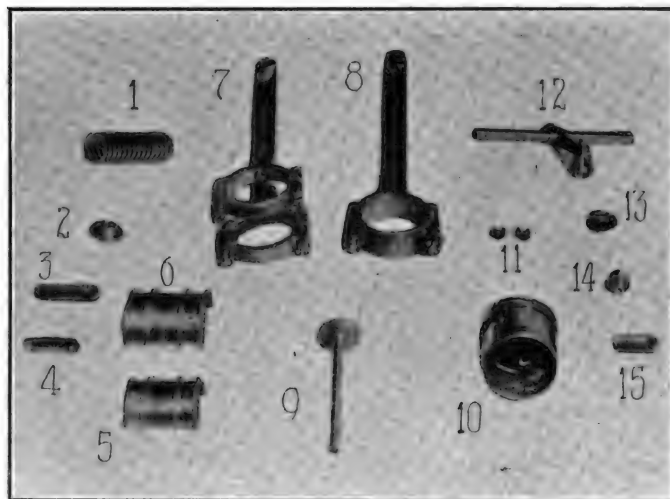
The front fan shaft bearing retainer may be removed with a special tool or pipe wrench and when the bearing is taken out the shaft may be dropped down sufficiently to allow the disconnection of the chain and removal of the shaft.

After the shaft has been taken out the fan shaft housing may be unbolted and removed from the engine. After the wires to the motor generator have been properly tagged and removed the cap screws holding this unit together with the starting switch to the housing should be taken out and the motor generator unit removed from the car.

Removing Units Between the V.

The exhaust manifolds are fitted with five flanges each, four of which are fastened to the cylinder blocks with cap screws, the fifth being bolted to the exhaust line. These should be removed next, leaving the space between the V free and open.

With the exception of the fan shaft assembly none of the units removed from between the V will require repair work upon them. Should either the motor generator or the air pump be damaged or worn, they should be returned to the manufacturer for repairs. The gears upon the fan drive shaft are all keyed to the shaft and may be removed with a wheel puller if replacement is necessary. It is important that the fan shaft bearings are both tight and that there is little or no play in the shaft.



Piston and Valve Components: 1, Valve Spring; 2, Valve Spring Retaining Cap; 3, Valve Stem Bushing; 4, Push Rod; 5, 6, Connecting Rod Bearings; 7, Outside or Forked Connecting Rod; 8, Inside Connecting Rod; 9, Valve; 10, Piston; 11, Split Valve Washer; 12, Rocker Arm with Shaft; 13, Cam Slide (Push Rod Bushing); 14, Roller for Cam Rocker Arm; 15, Wrist Pin.

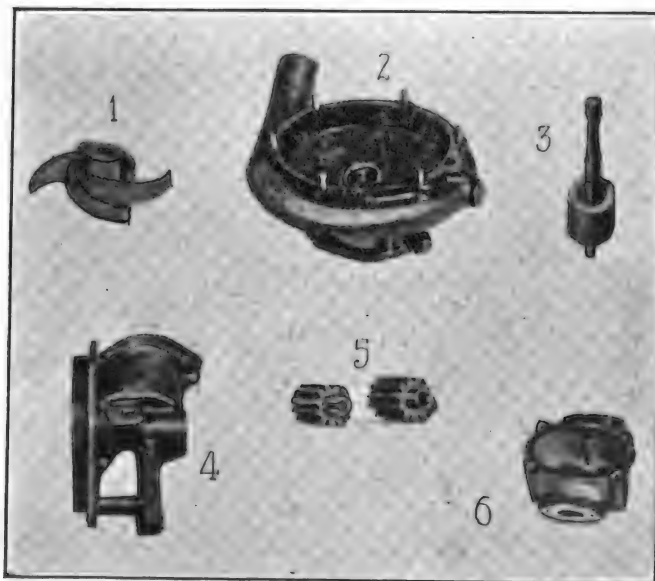
The oil base which forms the lower part of the crank case should next be removed, giving access to the crank case, main bearings and connecting rods. The connecting rods may be removed at this time through the crank case, the bearings and rings examined and replaced if necessary.

Lifting Away Cylinder Blocks.

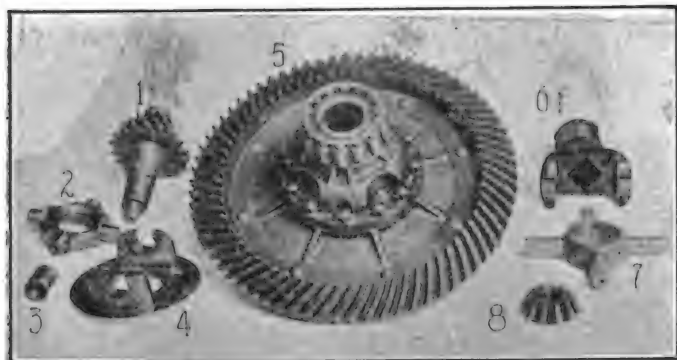
After the oil pan and pistons have been removed the two cylinder blocks which are fastened to the crank case by nuts and studs should be taken off and examined. To do the lifting a block and tackle should be used, owing to the weight of the cylinder blocks.

A block, box or other supporting arrangement should be placed beneath the transmission housing to keep it from falling and the transmission cover removed. Bolted to the fly-wheel is the large clutch driver casting. The six nuts should be removed, one at a time, by turning on the starting crank so that they will be brought within reach through the hand hole.

The bolts which fasten the transmission bell housing to the crank case should next be removed, as should the bolts at the three suspension points which hold the suspension



Oil and Water Pump Parts: 1, Impeller; 2, Water Pump Body; 3, Water Thermostat Unit; 4, Water and Thermostat Housing; 5, Oil Pump Gears; 6, Oil Pump Body.



Universal Joint and Differential Parts: 1, Pinion Gear; 2, Universal Spider; 3, Spider Bushing; 4, Yoke Flange for Universal; 5, Differential Assembled; 6, Sleeve Yoke for Universal; 7, Differential Cross or Spider; 8, Differential Pinion.

brackets to the frame. The engine may then be lifted from the frame.

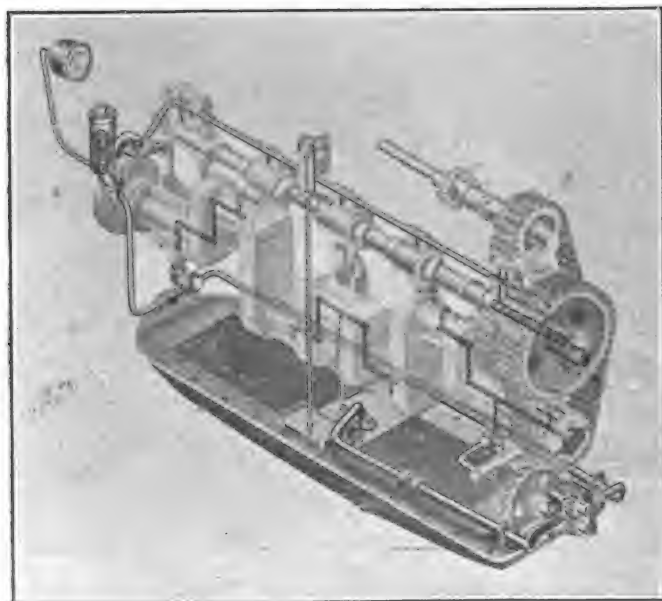
The oil pump assembly is next removed. Both the inlet and outlet elbows are flanged and fastened to the crank case by cap screws, these screws, together with the retaining nuts which fasten the oil pump body to the crank case, should be removed and the oil pump with gears taken off. The cover for the front end of crank case with starting crankshaft may next be removed, exposing the timing gears and chain.

Disassembling Rocker Arms.

The plate which holds the rocker arms and valve tappets is next removed from the top of the crank case. This assembly is fastened by studs to the crank case. The rocker arms are held in place by four shafts, which are pinned into the casting. The rollers should be given a careful examination and if worn out of round or loose on the pins, removed and replaced with new. The pins also should be replaced if worn.

Both the camshaft and fan driving chain should be removed next. Cut off the riveted head of one of the seat pins of the camshaft chain and remove the seat pin and rocker pin. The chain may then be removed. Since the fan shaft has been removed enough slack is left in the chain so that it may be taken off without cutting the chain.

All of the gears on the crankshaft and camshaft are keyed to the shafts and may be removed with a wheel puller. To remove the crankshaft, first unbolt and pull off the flywheel. This member is fitted to the crankshaft flange and held by nuts and dowels. After it has been removed the rear crankshaft bearing is exposed. The screws which fasten the bearing housing to the crank case are first removed, then the bolts which fasten the halves together are taken out. The hous-



Phantom View of Cadillac Oiling System.

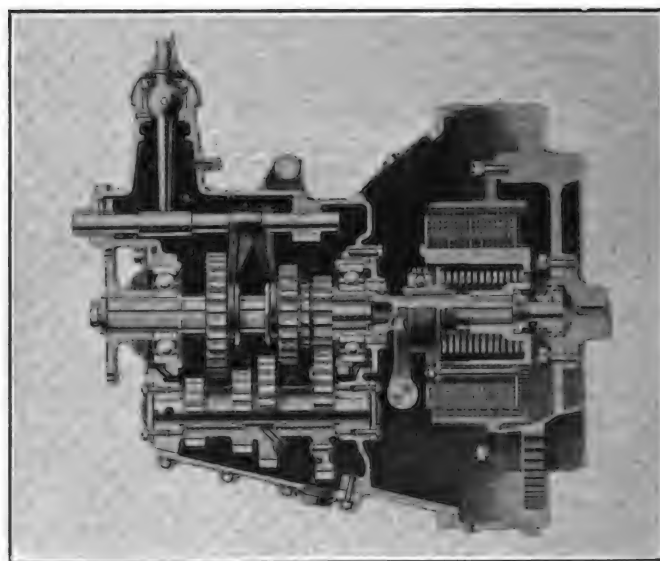
ing and bearing may be taken from the shaft and crank case. When all of the main bearing caps have been taken off the crankshaft may be removed.

The camshaft is mounted on three bearings, each of which is held in place by a set screw. Unless replacement is necessary, only the front bearing need be driven out to release the camshaft. With the front camshaft bearing removed the camshaft may be drawn out from the front of the case.

Beyond the renewal of packings the water pumps require but little attention. These two units are bolted to the front of the engine, each by two cap screws, and may be removed very easily for cleaning.

Cleaning the Oiling System.

The oiling system of the Cadillac car is force feed throughout and considerable time should be spent in giving it a thorough cleaning. All of the feed tubes leading from the pump and to the camshaft bearings should be flushed out with kerosene or gasoline. A good device for cleaning the oil tubes may be made from a tire pump and rubber tube; air pressure forced through the passages that cannot be reached by a stiff wire has a tendency to drive off the foreign parti-



Cross Section of Gearset and Clutch.

cles of dirt. The ducts in the crankshaft should also be cleaned in the same manner.

In the rear end of the crankshaft will be found a ball bearing upon which the clutch shaft revolves. This bearing should be examined and replaced if it shows signs of wear. The clutch assembly may be removed from the housing in two parts. The big containing drum or driving drum that was fastened to the flywheel may be slipped from the driving discs, then the nut on the end of the clutch shaft remove and the clutch assembly pulled from the shaft with a wheel puller.

Since the spring tension is very great, the clutch unit cannot be disassembled or assembled without special apparatus or tools. To remove the six nuts on the end of the front plate retainer with studs (illustrated) would result in a flying to pieces of the clutch unit, causing injury to the person doing the work. A handy clutch removing tool may be made as follows:

Special Tool for Working on Clutch Unit.

Obtain a bolt about 15 inches long and about one inch in diameter, or just large enough to slip easily into the hole through the centre of the clutch unit. Over the bolt and against the head place a large iron washer, then slip the bolt through the hole with the washer against the front part of the driver casting (see illustration).

Over the end of the bolt place another washer, large enough to press against the clutch spider upon which is mounted the ball release bearing. Then screw the nut on to the bolt until the pressure contracts the spring and releases

(Continued on Page 46.)

American Made Models For Motorists

By MRS. A. SHERMAN HITCHCOCK.



Motoring Coat of Hudson Seal, Trimming of Ermine. Courtesy William Jackman's Sons, New York City.



New Justine Motor Hat, Made of Patent Leather and Velvet. Courtesy New York Mfg. Co., New York City.



Handsome Limousine Frock of Moon-Glo Satin, Trimming with Skunk Fur Severely Plain, Chic, Most Exclusive.

DAME Fashion is very enamoured of fur this season and never has been seen so many garments for the motorist made of this luxurious and cold resisting material. Coats, capes, hats, hoods and bonnets are made from fur, while it is used in great quantities as a trimming on coats, suits and frocks, and linings of it appear in wraps of all kinds. The motor woman can be warm and comfortable no matter how serious Jack Frost and Old Boreas may be in their attentions. Where a motor woman once upon a time was satisfied with one fur coat, which incidentally, lasted her several years, she now must have the coat plus several sets of fur. Moreover, she requires that her suit, her frocks, her hats and her numerous accessories all are fur trimmed.

The first and most important essential in buying furs of any kind is reliability, and the more expensive the fur garment the more careful attention should be given the purchase. If one is not an expert in judging furs—and the majority of women make their choice merely from appearance and what the salesman tells them rather than any expert knowledge of their own—the very best way to obtain reliable and durable garments which are sure to give entirely satisfactory results is to purchase them from a reputable firm whose authenticity is unquestioned and who will stand back of their garments.

Fur Coats Generous in Length.

The fur coats come chiefly in long, luxurious garments, while there are many capes with the same generous amplitude. Three of the representative styles in fur



A Fetching Motor Cap and Bag Designed by Madam Spencer. Courtesy Johnson, Cowdin & Co., New York City.

motor coats, Jackman models, show all the newest ideas—deep pockets, large collars and fur belts, the latter representing the real badge of fashion on the fur coat. Made entirely in one fur, with the collar trimming of ermine, the coat of Hudson seal proves quite conclusively that the belt gives a rich simplicity to a handsome model. On other coats, belts, cuffs, collars and bands of contrasting furs are used with stunning effect. The belts may encircle the waist, or extend only half way around the figure, either at front or back. The belts are placed at a high waist line, the normal line, or are well down over the hips, according to individual taste and becomingness to the figure. There are both the ripple and straight line models, one as modish as the other.

The Hudson seal model, with large collar, cuffs and deep skirt band of Kolinsky squirrel, is a particularly ideal model for the motor woman, on account of its wonderful warmth and protectiveness occasioned by the excellent fur trimmings. It would be quite impossible to be cold in any weather when wearing this garment. The collar, like nearly every motor model, may be turned well up around the throat and ears, thus affording extra protection.

New Belt on a Squirrel Coat.

The splendid coat of gray squirrel, trimmed with taupe fox, is all that could be desired in a fur garment. The taupe fox adds just a note of pleasing contrast to the deep gray of the wrap, and we all know that fox fur is a strong leader this year. The squirrel coat, you will note, has the new belt tipped at the ends with

the taupe fox. These models are particularly well constructed, made of the genuine pelts, and are absolutely reliable in every particular. Many other models in motor coats were shown me in this same reliable make of the durable furs, such as Hudson seal, nutria, squirrel and muskrat, and also in very desirable combinations of these furs; for instance, nutria and seal used together. Rabbit fur with a new gray dye is called polluchon and adorns many coats. Polluchon is soft and pretty and very becoming and not so very expensive.

There are the other furs well represented, ringtail cat, hare, raccoon, beaver and dyed coney, in fact, just the kind of a fur motor coat that any woman wants. Skunk fur is strongly in the lead for trimming because it is eminently effective and moderate in price. Kolinsky is another very modish and beautiful fur, and personally my own favorite, which is exceedingly popular as trimming. Every exclusive house is using considerable of the latter, for with its lovely glossy brown it is very attractive to the majority of women.

Cape of Fur in the Wardrobe.

The cape of fur is one of the latest additions to the wardrobe of the motor woman. They are loose and straight hung and narrow surprisingly but gracefully at the bottom. The collar is usually of some other fur than the cape and there is also a wide band around the bottom in many instances.

The most beautiful linings appear in these fur capes of zantine—the most modish silk of the season. The wonderful colorings and original and artistic designs lend themselves particularly to combine most effectively with the richness of fur. A cape of Hudson seal, for instance, had a large collar of kolinsky and there was also a wide band at the bottom. The lining was of zantine in a striking and novel design which combined the softest and loveliest of blues, reds, greens and gold most effectively. A long scarf of the zantine was made to accompany this cape. It was three yards in length and one yard in width. The ends and sides were hemstitched and each end was drawn together and finished with two tassels, one of blue and the other of gold. The quality of zantine is so wonderfully soft that a motor scarf is most delightful to wear and adds a delightful spot of color when the coat is thrown open. It is also very protective wrapped around the throat and may be worn with equal effect under the coat of wool.

Newest of Motor Hats.

How do you like the new "Justine" motor hat? Made of black patent leather, trimmed with band bow and under brim of velvet, it is quite the smartest thing in the hat line I have seen of late. It may also be had in all the new shades. There is another delightful creation for the motorist called "Sunnybrook Tam," made of silk seal plush and adorned with a tassel. With this may be worn very effectively the new "Polly" stole, which is brand new and has a charm and dash all its own. It is made of pressed plush,



Made of Hudson Seal and Trimmed with Kolinsky Squirrel. Courtesy William Jackman's Sons, New York City.



Modish Squirrel Coat, with Large Collar and Muff Cuffs of Taupe Fox and Belt of Fur Finished at the Ends with Same as Trimming. Courtesy William Jackman's Sons, New York City.

trimmed with heavy silk tassels and has a fancy faille lining, and may be had in black or colors. They are so comfortable and may be removed or put on so easily that they are a real practical addition to the motor wardrobe.

A Motor Cap and Bag Disclosed.

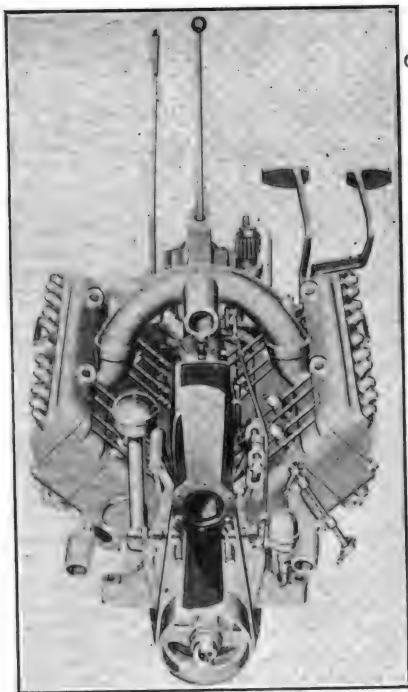
I am illustrating a very new motor cap and bag which every woman will want just as soon as she sees them. This cap and bag set is exclusive and original and is the design of Madam Spencer, who is well known for her artistic and novel creations. This set is made entirely of ribbon and may be had in all the desirable colors. The particular model shown in the illustration is made of purple, lined with old gold. The tam cap is trimmed with a buckle of the gold ribbon. It is so built that it will pull well down on the head. The scarf winds closely around the neck, thus making a very comfortable headgear when adjusted. The end of the scarf is ornamented with two tassels, one of gold, the other of purple. The bag is also of the purple, with lining of gold. There is a ring attached which may be carried on the wrist or brought down over the bag to keep it tightly closed. It is equipped with a change purse and a powder puff and case, all in matching color. It is a most convenient article and the loveliest thing I have seen in bags this year. It is roomy enough to carry along everything the motor woman wants with her on any ordinary drive.

Popularity of One-Piece Dress.

For fully two seasons past the one-piece dress has held a most important place in the wardrobe of every motor woman. The smart simplicity of these frocks, their great comfort and their unusual serviceability recommends them very strongly to the motorist, and it does seem as though one could not have too many of these practical and attractive garments. The one-piece frock to be smart must be simple. The waist line may be anywhere this season, high, normal or very low. Sleeves are very long and tight and many are buttoned from the elbow to the wrist. There is a diversity of opinion regarding the collar; some of the designers are trying hard to persuade women to adopt the choker and, no doubt, there are some women who will be seen in high collared frocks, but the majority of women stubbornly refuse to give up low necked frocks and there is no doubt of the result. Women have been so comfortable without collars, to say nothing of the physical benefit thus derived, that it will take something more than fashion designers to lead them back into paths once forsaken. The East and West come together in many of the Chinese like frocks and the two combine in the straight slim silhouette of the hour.

Another Smart Silk Frock.

Zantine, a silk which has just made its bow to the public, is particularly adaptable for the smart motor frock. This is given the name of "the all-becoming silk" on account of its wonderfully blended colorings, which are becoming to both



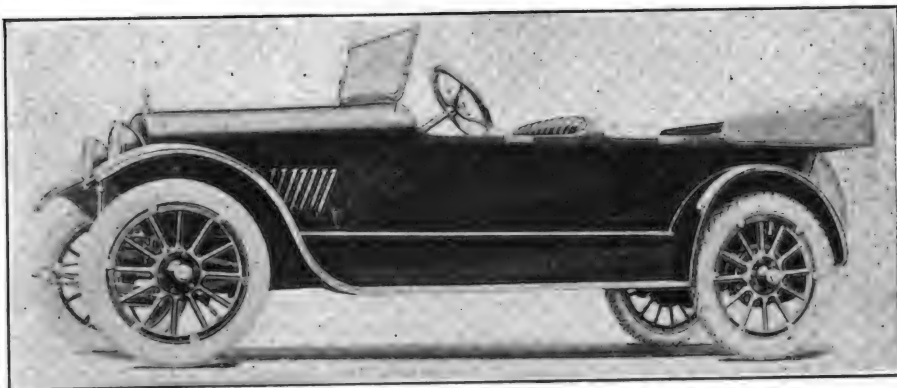
Jackson Valve-in-Head Engine.

blonde and brunette. Combined with bengaline, satin, Georgette, or, in fact, any modish material, the result is all that could be desired. A charming little motor frock in dark blue bengaline—a lovely blue so dark that it looks like black, save in a strong light—is very cleverly combined with zantine of a dashing color combination of orange, rose and green. It is a chemise frock drawn on over the head; it is open in front from throat to belt and slashed on each side from hem to hip. It has a large scarf collar, which comes down and ends in panels. The panels end shortly below the hips and are finished with silk tassels. There is a lovely pattern in zantine, combining a rich blue, orange, green, lilac and a light blue. The quality of this material is unusual, being very fine and soft and is to be one of the most popular of the season for every purpose where silk may be used—and it is used to a very great extent in motoring garments.

Swagger Sticks for Motor Women.

The swagger stick has come into its own since the United States became an ally, and the motoring woman is now quite enthusiastic over adopting it for her very own. The smart shops are showing swagger sticks made particularly for the motorist. One which was shown me was topped with a steering wheel, which had for its centre the seal of the United States. Another in a light colored wood was topped with a miniature motor car in red, white and blue enamel; and a third was of black finished wood mounted with a sterling silver monogram. A short chain and ring, also of silver, slips over the finger.

A. Elliott Ranney, head of the company bearing his name, agents for Hudson, King and Daniels cars in New York City, has entered military service in the ordnance department.



Jackson Valve-in-Head Eight Four-Passenger Flyer, Showing New Straight Line Body on 118-Inch Wheelbase.

JACKSON FLYER AND 1918 MODELS

Body Refinements of a Distinctive Type Announced
With Continuance of Notable Valve-in-Head Eight.

WHILE body designs seemed to have attained a perfection of comfort and appearance that defies improvement, the Jackson Automobile Co., Jackson, Mich., in their new 1918 models just announced are featuring in their new styles refinements and innovations of a distinctive type. The leader of the Jackson line this year, which will include six new body styles, is the Flyer model. It is built on the long and low racer type. Not only is it distinctive, but very practical and comfortable. This model is offered in the choice of four color options including the standard color azure blue with black band and fine white stripe trimmings. The other three optional colors have not yet been announced.

Departures in Design.

In this model there is a sudden drop from the cowl to the side, which, with the straight line to the back of the car forms a distinct contribution to 1918 designs, conforming to the trend to touring car body rather than roadster body for four-passenger cars. From the fact that the side body line drops in a gradual slant from the cowl to the rear in the cruiser model comes the comfortable, enveloping impression that passengers are sitting in the car rather than on it. The five and seven-passenger cars have a similar appearance, the former being constructed along more conservative lines.

The sedan model is of the Springfield type, and is built in the Jackson coach shops under the regulation Springfield patterns. It is a practical year round car which may be changed in but a few minutes from an open type to an enclosed body.

All of the other models are graceful in line and well finished.

At a slight addition in cost practically any standard color design may be had to suit the buyer.

Description of Power Unit.

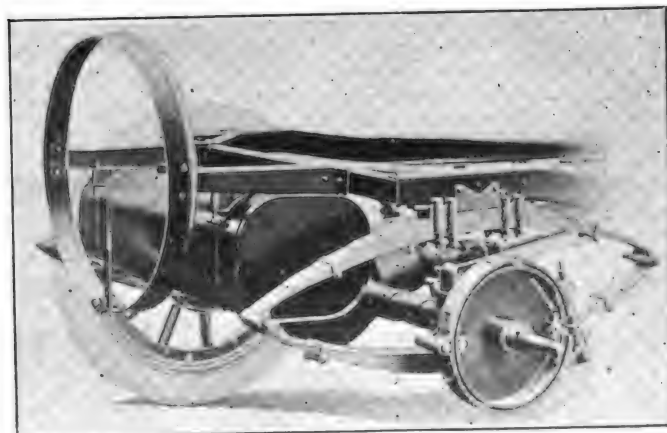
United with the Eight idea in the Jackson line is the valve in head principle of motor design. The engine is of the V type, eight cylinders, with valves in heads, and generates 48 horsepower at 2400 revolutions per minute. Under the S. A. E. rating the horsepower is 28.8. The bore is three inches and the stroke $3\frac{1}{2}$. A powerful motor for its weight and piston displacement, the Jackson valve in head is mechanically the same as has been used for the past two years, with improvements.

Both cylinder blocks and crank case are cast in one unit and fitted with removable heads. Fitting closely to the heads are covers, which completely enclose the valve rocker arm mechanism.

The connecting rods are forked and have both bearings fully adjustable for wear. Both sets of valves are completely enclosed and are operated from a single camshaft.

Lubrication Improvement.

Lubrication is had by a variable forced feed system, the oil being pumped from reservoir to regulator, thence through hollow crankshaft to bearings. The oil



Rear of Jackson Chassis, Showing Rugged Construction and Full Elliptic Springs.

supply through the pump is governed by the throttle opening, solving the old type Eight's problem in this new car. The foot throttle regulates the oil supply automatically according to the engine's speed, whether it is racing or idling.

A Zenith duplex carburetor, having a separate mixing chamber for each cylinder block, is mounted high between the blocks and furnishes gas to a water jacketed intake manifold. Gasoline is furnished through a Stewart vacuum system from an 18-gallon tank in the rear.

The Auto-Lite ignition system is used, with hand spark control. The distributor unit being mounted in the V between the cylinders, with short secondary wires leading to the plugs.

Both the engine and transmission gear-set are in one unit, the flywheel housing enclosing the multiple disc clutch, which is lubricated from the transmission. The transmission gearset is of the sliding gear, selective type, having three speeds forward and reverse. The gears and main shaft, which is mounted on Hyatt roller bearings, are of nickel steel.

Rear Weight Distribution.

The rear axle is full floating type, the weight of the car being carried on the

MANNING UNCLE SAM'S WAR CARS

Opportunity In the Ordnance Service for Thousands of Machinists, Wheelwrights, and Allied Workers.

READERS of this magazine, both individual motorists and motor tradesmen, managers and superintendents, who give wholesome counsel to their workmen, are asked to read below a call for service from what is known as the ordnance department. Everyone knows that thousands of trained hands and strong arms are needed for the assembling and upkeep of war cars of all sorts. It is no less a worthy service than to be out in the front, fighting in the trenches and "going over the top." It is an essential service for the aid, protection and supply of those who do take the war cars and guns afield against the foes of liberty. To serve best, choose wisely.

INFORMATION TO APPLICANTS FOR ENLISTED ORDNANCE CORPS.

What It Is.

The Enlisted Ordnance Corps, National

dinarily be sent to an arsenal school for a period of instruction, on completion of which they will be assigned to detachments, units or organizations, with ultimate service abroad. Previous military training, while preferable, is not essential, as men will continue the work which they pursue in civil life.

Pay and Grade.

In view of the importance of their work a large number of men will serve as non-commissioned officers. Original enlistment is required as private, but later courses of training or special qualifications quickly lead to higher grades. Pay ranges from \$30 to \$97.20 a month, depending upon demonstrated ability and place of service. Men enlist for duration of war only.

Free quarters, rations, clothing, bedding, medical attendance, etc., are provided.

Relation to the Draft.

Men registered under the selective service law may voluntarily enlist prior to the posting of their names by their local boards. No man who has been called to appear for physical examination is eligible for enlistment in any branch of the military service. In case such men do enlist the department under which they have enlisted will be requested to discharge them and direct them to report to their local boards.

HOW TO ENLIST.

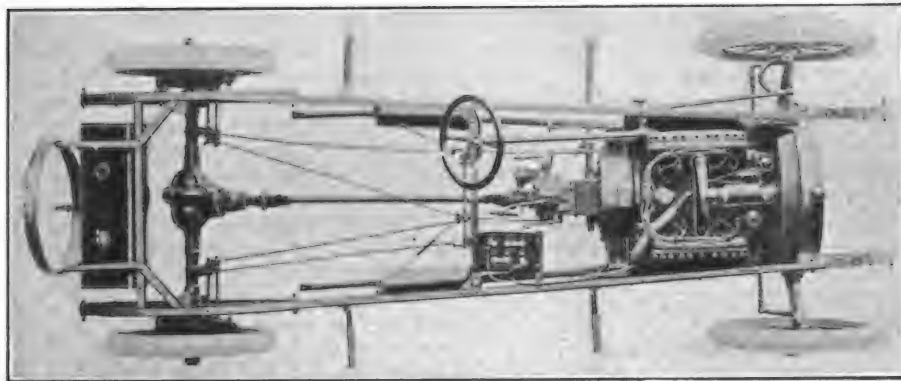
Get application blank by writing to Chief of Ordnance, Enlisted Personnel Division, Washington, D. C. Fill it out, return to Chief of Ordnance, and if there is an opening for you at the time, authorization will be sent you to enlist at the nearest recruiting station, and if accepted there, free transportation will be provided to place of service.

NEW MOTOR PARTS STATION IN BOSTON.

The Motor Parts Co. of Philadelphia has leased a new building in Boston for its sales and service branch, where complete equipment is being installed for sales service, repair and installation of Bosch ignition, starting and lighting systems, Westinghouse Ford equipment, Zenith carburetors, batteries and other accessories for which the company acts as New England distributor.

The new building, which is at 104-106 Brookline avenue, has approximately 23,000 square feet of floor space, and will be occupied about Nov. 15. The present station at 185-187 Columbus avenue will then be vacated.

S. Uswald, for the past nine years with the Bosch Magneto Co., New York, will have charge of the sales department, and the other departments will be in charge of men who are authorities in their field.



Jackson Chassis, with Mounted Valve-in-Head Motor, Showing Strong Members, Neat and Compact Arrangement.

axle housing through Hyatt high duty roller bearings. Drive is of the Hotchkiss type, the rear springs absorbing all of the torque and drive.

Both the front and rear springs are full elliptic of ample dimensions and designed to absorb all road shocks. The wheelbase is 118 inches and all wheels are 34 by 4 inches.

The steering gear is of the worm and gear type, with adjustments for wear. Both the service and emergency brakes operate on the rear wheels upon brake drums two inches wide by 12 inches in diameter.

The prices of the Jackson models for 1918 are as follows: Seven-passenger Jackson Springfield sedan at \$2195; five-passenger touring, four passenger cruiser and a two-passenger roadster all at \$1495; seven-passenger touring at \$1570, and a four-passenger flyer at \$1575.

The equipment furnished with the cars consists of a one-man top, sloping rain vision windshield, speedometer driven from transmission, tire pump, ignition lock, dash light, electric horn, oil pressure gauge, ammeter, foot rail, coat rail, tools and demountable rims.

Army, into which the Ordnance Enlisted Reserve Corps has been merged, is charged with the supply, maintenance and repair of all cannon and artillery vehicles and equipment; all machines for the service and manouever of artillery; all small arms, ammunition, harness, motor trucks, motorcycles, tractors and railroad cars; in fact, it is the army behind the army, commonly known as "Service of the Rear."

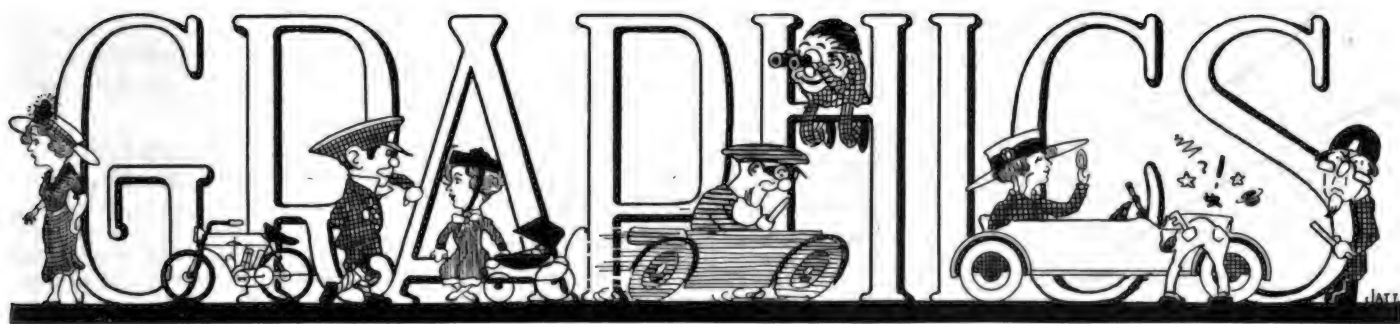
Type of Men Wanted.

There is a place for practically every man who knows a trade in the Enlisted Ordnance Corps. Machinists, mechanics, plumbers, painters, carpenters, canvas workers, auto mechanics, saddlers, blacksmiths and wheelwrights are especially needed at this time.

Applicants must be between 18 and 40 years, citizens or declarants, and be able to speak, read and write the English language, should have no absolute dependents, and must be able to pass a physical examination conforming to that prescribed for the regular army.

Place and Type of Service.

If accepted for enlistment, men will or-



Senator La Follette will not laugh a lot if many more of the automobile men get the hook out for him. President A. R. Erskine of the Studebaker Corporation, South Bend, Ind., introduced a resolution at a meeting of the Rotary club in that city asking for an investigation



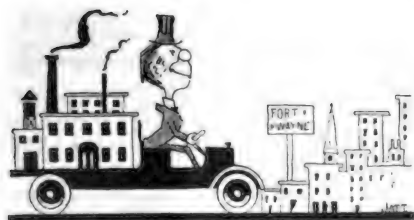
by the Senate of the Wisconsin's alleged seditious and disloyal utterances. The resolution demanded the immediate unseating of La Follette if the charges were true. A copy of the resolution was mailed to Vice President Marshall and the senators from Indiana.

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A head mechanic in a Jersey City garage has a racing car with which he has been busting fences at the fall fairs in that little old state the President comes from. The head mechanic built it himself. He used a Pope-Hartford engine and parts from 12 different makes of automobiles. Before acquiring the fence breaking habit at Trenton and Danbury, where there were muddy tracks and other racing gentlemen competing by the names of De Palma, Chevrolet and Lou Hearn, the car ran a well behaved course at Red Bank and took down prize money.

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Ft. Wayne, Ind., is feeling its oats these days since the Supreme Motors Corporation of Cleveland decided to favor it with a million dollar car plant and the city fathers are looking forward to the day when it might rival the Automobile Capitol as a motor car centre. The



new company will be headed by Clarence F. Jamison of Lafayette, formerly assistant general manager of the Elgin Motor Car Co., and his reasons for selecting Ft. Wayne as a site for the new plant are also a source of pride for the residents. He says: "We selected Ft. Wayne be-

cause of the excellent spirit of co-operation and continual boosting for which this city has become famous throughout the country."

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Pretty girls in cars loaned by Manhattan's automobile row invaded Wall street and the congested sections of the city at a recent noon hour selling tickets to the United States Army and Navy Bazar, carded for the Grand Central Palace, Oct. 27 to Nov. 3. They came away with knitting bags stuffed full of coin and bills.

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Manager McGraw of the New York Giants is solacing himself for the loss of the world's series in a Paige landaulet limousine, which he bought one day during a lull in the big battle between the baseball boys.

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It is admitted that the Germans are in a bad way, but every motorist's heart will go out to the Crown Prince in his present hour of great sorrow. Although Papa Kaiser is the sole owner of four pneumatic tires in Germany, his favorite



son Willie has been denied their use and is obliged to pilot his car back and forth across the highways leading to the front with nothing to absorb the shocks and road jolts but old ropes, rags and other materials which are wrapped about the wheels of his car in place of tires. His torture, however, is shared by all other Germans who persist in motoring, as the only substitutes for tires to be had are makeshifts similar to those used by the Prince. There is very little motoring in that country now, as only army officials and others high up in the matters of state are granted the privilege, gasoline being worth over \$6 a gallon.

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The defunct Black Diamond Automobile Co. paraded into the New York mayoralty campaign, thereby inducing Charles E. Turner of Brooklyn to submit an affidavit that Judge Hylan ceased to have any connection with the company before the person who wrecked it was brought into it. Mayor Mitchell's fight for re-election as an independent candi-

date has run the bearings of this impending municipal election exceedingly hot.

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The demise of the Demon Rum which seemed so imminent when Congress got after it with an excessive tax seems to have been postponed indefinitely, since



in the dry states the boys continue to devise ways and means of bringing their favorite beverages past the state officers. In Hagerstown, Md., ingenious persons conceived the scheme of pumping liquors into the deflated tires of automobiles in order to get it into dry West Virginia, but were detected when one of the members of the party, being unable to resist a burning thirst, was caught drawing a high ball from the tire valve.

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Motoring enthusiasts in Easton, Pa., have had the joy of their local automobile show deferred from October until late in January, due to the discovery by the committee of arrangements that most of the dealers will not have their 1918 models until that time. Meanwhile "the orchestra and decorations will be greatly augmented, as the additional time will be utilized in thinking up new schemes to please the public." Listen for much music and many motors in Easton in January.

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Taxicabs in Detroit have become one of the most popular forms of travel with the stage door Johnnies, the town flirts and lady killers since the young lady chauffeurs made their appearance on the



box. They are attired in special uniforms, readily learn to navigate their cars through the crowded sections of the down town streets, and are immune to the wiles and advances directed at them from passengers in the tonneau who might be inclined to flirt.

Must have had another big potato crop in Maine. Under the state law a car owner gets a half rate on license registration between Oct. 1 and Dec. 31. It is evident that a whole lot of people have heard of that provision of the law and delayed purchasing their autos, says the Bangor Commercial, for they are appearing in "droves" at the Automobile Registration bureau, department of state, for registration under the reduced rates.

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Patriotic motorists in many cities aided the flotation of the Liberty Bond issue by carrying placards on their cars or



having signs painted on the windshields. It takes a great war to make a motorist let a billboard be made of his car front. After the war is over, what?

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Lima, O., made a great time of the departure from that city of the first Liberty war truck. The standardized machine, built in the Gramm-Bernstein factory there, was the centre of honor in a patriotic parade just before it left on its overland trip to Washington, a christening ceremony was held, anthems were sung on the public square and patriotic addresses made. There will be 35,000 copies of it made in the same factory to go trekking with the National Army on the trail of the Kaiser to make the world safe for democracy.

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Not only will the National Automobile Shows to be held in New York and Chicago have a greater number of cars on exhibition, but the displays of parts and accessories will outnumber those of any previous show.

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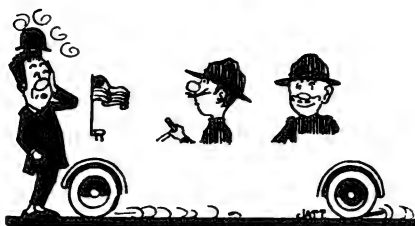
Honeymooning in an automobile is no novelty, but participating in a marriage ceremony while going over the road at 25 miles an hour is unusual enough to



warrant more than passing attention and that is the reason why a ceremony under those circumstances was decided upon by Mrs. Dora Patton and Claude C. Walters of Marion, O. The bride in explaining this peculiar choice of a bridal setting, said: "No. It wasn't an elopement. We just wanted the novelty of the thing, so we speeded up."

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Camouflaging automobiles is an art and science now in the war zones of Europe and it has been perfected to a state where the car at any great distance be-



comes almost invisible. Military men in this country have been experimenting with camouflaging and have obtained some remarkably effective results, treating their cars with different hues of paint so that they blend with the background at a short distance away from the observer and become practically invisible to the naked eye.

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Practically all motorists have experienced close shaves while out touring, figuratively speaking, but literally speaking, the only close shave on record en tour is that performed by C. A. Latons of the C. A. Latons Auto Co., Worcester, Mass., who while en route to Boston drew some hot water from the radiator, took out his razor and accomplished the tonsorial stunt without mishap. He used the mirror on the rear of the spot light to reflect the operation while his companion drove the car along at a merry clip. He did not perform the stunt to prove that a motor car is as convenient



as a barber shop in which to procure a shave, but because his beard needed trimming. Incidentally, however, he demonstrated the exceptionally smooth riding qualities of the Elgin car in which he was traveling and for which he is the agent in Worcester County, Mass.

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The directors of the Kent County, Michigan, work farm, finding that it cost as much to feed the horses on the farm as it did to operate the institution, have decided to motorize the work next year. The year's crops and the money derived from the sale of the horses will provide a fund for purchasing the motor apparatus and they are of the opinion that the saving effected by the new equipment will soon defray the original cost.

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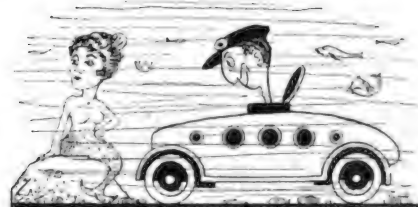
The Macon, Ga., Motor club receives organizing assistance from a ladies' committee that put on a campaign to increase the membership of the proposed



motor club from a meeting held on the mezzanine floor of a leading hotel. True south land flavor in all those M's—Macon, mezzanine and motoring.

—:—:—

Simon Lake, the inventor of the terrible U boat that brought our country into war, has turned his inventive genius to a more harmless device and one which instead of aiding the machinations of Mars can be turned to the pursuit of pleasure or money. His latest device is an under-sea automobile, which he claims can be



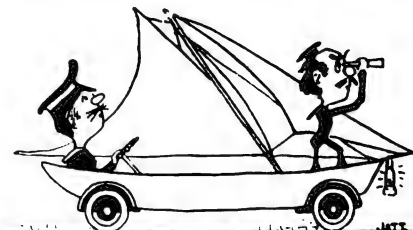
used as a mother ship for submarines, for salvaging wrecks, digging up shell fish and from which one can spear fish.

—:—:—

Garage proprietors and gasoline dealers in New York state would be required to post conspicuously the price, quality and make of all gasoline offered for sale under legislation recommended in the recent New York State Automobile Association convention. Other proposed legislation approved would make it impossible for road contractors to close a road without first having provided convenient and suitable detours; provide that both sides of a highway may not be covered with oil at one time unless that oil is suitably surfaced; render it impossible for any city or incorporated village except New York City to adopt local speed ordinances; or provide for licensing without examination or fee of all automobile drivers; make it obligatory for the names and addresses of automobile owners to be furnished by the secretary of the state and the police to automobile club when request is made through proper authorities.

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The limit in eccentric body designs for



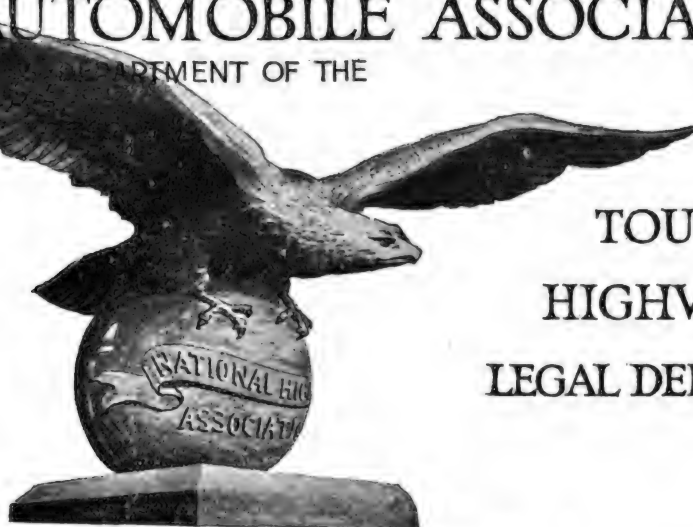
motor cars seems to have been reached by H. I. Silver, the New York dealer, who turned out a yacht like creation for one of his fastidious customers that suggests its nautical character in all its equipment and appointments. The ends of the fender in front are formed as anchors, a ship's bell is fitted on the radiator, a ship's wheel is on the engine hood, life preservers and other standard boat equipment are in evidence, while the body is launch shaped and made of two-colored wood, suggesting boat construction.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Interstate Cooperation to Halt Reckless Drivers

THE reckless drivers of automobiles in states in which they are non-residents, who have heretofore felt that all that was necessary was to cross the state boundary line in order to be immune from arrest or trouble, will soon find themselves in an unenviable position if the aims of the commissioners of New England and adjacent states in charge of motor vehicles bears fruit. At a recent meeting of motor vehicle commissioners held in New York plans were discussed to punish interstate reckless drivers. New Jersey, Connecticut and Massachusetts were represented at the conference and it is believed that if a plan is adopted by these states it will also meet with the approval of other New England states and possibly New York and Pennsylvania as well.

It was shown at the conference that many persons are losing their lives in every state by the reckless driving of automobiles by non-residents and that where there are no laws of a state designed to meet the situation, commissioners do not feel authorized to take drastic action without authority against unreasonable drivers. Serious automobile fatalities are becoming more and more impressive to those in charge of motor vehicles in New York. In September alone motor vehicles killed 46 persons and throughout the state and the year ending 1917, 636 persons were killed by automobiles. All the steam railroads of the country did not kill one-half as many during the last two years. This is practically the situation in almost every state in New England today and something in the way of preventive measures must be devised which while not restricting traffic too much will nevertheless increase the public safety.

What to Do When Arrested or Involved in an Accident.

In view of the serious situation in which one of our members lately found himself involved while operating a motor vehicle in a state in which he was not a resident (although perhaps it makes little difference whether a motorist is a resident or non-resident of a particular state), we offer certain suggestions for the guidance of motorists which may be not without value when stopped by the police or complained of for violations of automobile laws and regulations or when concerned in an accident. A great majority of motorists are good, law abiding citizens, who are disposed and desire to do everything that might be expected from respectable people; but this disposition and attitude are often misunderstood or misconstrued.

Therefore, it may be of assistance to bear in mind the following points whenever the occasion arises.

Give your name and address to any officer who may request it, or such party as may properly be concerned in the accident.

Do everything possible in an accident to assist or to alleviate the suffering of injured parties.

Remember that you are not obliged to "explain things" to an arresting officer or injured party.

The safest thing to do is to act courteously, but keep your own counsel.

Do not enter into arguments or controversies.

Instead (and be sure to do this) make observations, measurements, take the names of witnesses and their stories of the affair.

Then call up the Legal Department of

the association for advice or assistance.

If you wish legal advice as to your rights and liabilities, communicate with the Legal Department at the head offices of the association and immediate attention will be given to these matters.

If the emergency arises for immediate action by local counsel consult our attorney nearest to you.

In any event consult the Legal Department before presenting or settling claims, or as soon as you are threatened with complaints or suits.

DRIVING A MOTOR CAR.

The following advice, so succinctly stated by Farm and Fireside, may prove not without value to our readers.

Tires last about twice as long on a car that is driven at 15 miles an hour as upon cars driven at 30 miles an hour. Speeding generates heat, which is an enemy to rubber.

Driving a car around a sharp corner at 25 miles an hour does more damage to the tires than 200 miles of straight road work. Excessive side pressure on tires may pinch the tubes, and it always strains the side walls of the casings.

High speeds are likely to cause skidding and breakage of springs and steering gear, any of which are dangerous when speeding.

In proportion to the mileage obtained high speeds require more gasoline and oil than a moderate rate of traveling.

Driving a car at excessive speed, especially over rough roads, subjects the bearings to enormous strains.

High speed may cause crystallization of rapidly moving metal parts that are subject to strain, and these may break at any time without warning.

An Interesting Automobile Insurance Decision

Policy an Effective Instrument for Both the Assured and the Injured, Is Ruling Made in Massachusetts.

TWO years ago the Legislature of Massachusetts enacted a law to the effect that "In respect to every contract of insurance made between an insurance company and any person, firm or corporation, by which such person, firm or corporation is insured against loss or damage on account of the bodily injury or death by accident of any person, for which loss or damage such person, firm or corporation is responsible, whenever a loss occurs on account of a casualty covered by such contract of insurance, the liability of the insurance company shall become absolute, and the payment of said loss shall not depend upon the satisfaction by the assured of a final judgment against him for loss, or damage, or death occasioned by said casualty. No such contract of insurance shall be canceled or annulled by any agreement between the insurance company and the assured after the said assured has become responsible for such loss or damage, and any such cancellation or annulment shall be void; and upon the recovery of a final judgment against any person, firm or corporation by any person, including administrators or executors, for loss or damage on account of bodily injury or death, if the defendant in such action was insured against said loss or damage at the time when the right of action arose, the judgment creditor shall be entitled to have the insurance money, provided for in contract of insurance between the insurance company and defendant, applied to the satisfaction of the judgment, and if the judgment is not satisfied within 30 days after the date when it is rendered, the judgment creditor may proceed in equity against the defendant and the insurance company to reach and apply the insurance money to the satisfaction of the judgment."

A few days ago the Supreme Judicial Court of Massachusetts was called upon to construe the statute, and as its opinion cannot but be of interest to motorists, we refer to it at some length.

Briefly, the court said, a suit in equity was brought by one who had recovered judgment for bodily injuries caused by the negligent driving of an automobile, and the insurance company who had insured the driver against loss or damage arising from such a case by a policy dated subsequent to the time when the statute became effective. A demurrer to the bill was filed by the driver and the insurance company on the ground, as they contended, that the statute was unconstitutional.

The court, in its opinion, points out some of the complexities of phraseology of the statute, but holds that the legislature has power under the Constitution to enact the statute, as the court inter-

pretes it, and in support thereof quotes from an opinion of former Chief Justice Knowlton to the effect that the legislature has large powers for the regulation of the business of insurance; that it may act under the police power for the protection of the public, or it may act as the creator and controller of corporations, domestic and foreign, which are subject to its power, and that this has been decided in many cases in this commonwealth and elsewhere.

The subject of insurance, the court continues, is of such general public interest as to be under the control of the legislature within rational limits. When a statute has been enacted governing any particular principle of the field of insurance, the parties entering into contracts respecting that field are presumed to do so with reference to the obligations and terms established by that statute. Although prior to the passage of the statute now attacked, a contract of insurance like that here in question would have been valid and enforceable under a previous decision of this court, yet now the insurer, by issuing a policy of casualty insurance, impliedly agrees to be governed by the terms of the statute and to consent that this obligation to the insured shall, to the extent of a judgment recovered by a third person against the assured for a casualty covered by the insurance, be hypothecated for the benefit of such third person.

The statute is reasonable in its purpose and effect. Its obvious design is to afford to the assured, who has complied with every other term of his contract and has paid all premiums demanded by the insurer, to pay the loss and damage for which he was liable and against which he was insured. A man without capital or credit might be powerless to meet his obligation and put himself in position to recover against the insurer. The man of slender resources, or doing a considerable business on a small capital, might be forced into bankruptcy and get little or no benefit from the insurance for which he had paid. The persons injured by accidents, for which such classes of assured might be liable, would be in effect remediless as to practical results for damages sustained by them. It well might be thought by the legislature a sound public policy that casualty insurance should become an effective instrumentality for both the assured and the injured, and not be a snare to the assured and a barren hope to the injured. If the legislature believed this, it reasonably might decide to frame the terms of policies of casualty insurance and to provide means for their enforcement to the end that these results might be avoided, and to declare that policies lacking these requisites should not be writ-

ten, or if written, should be ineffective as to these terms.

When confessedly the general subject of insurance is under legislative control there is a broad latitude of choice as to the means which may be employed to reach results thought to be desirable. The principle here declared and the decisions upon which it rests do not derogate in any degree from the right of freedom of reasonable contract and the right to acquire and possess property which are among the essential guarantees of our Constitution. They do not infringe upon the principles declared in numerous cases sustaining such rights as illustrated by a former decision of this court and the cases there collected.

Of course the legislature cannot create a debt out of hand from one person to another without the express or implied consent of the person to be charged. But it is a very different thing to enact a statute to take effect as to contracts thereafter made.

Held that this statute is not unconstitutional, as the legislature may establish appropriate forms of relief for existing rights or those rightly created, and that it may provide equitable procedure for the enforcement or protection of such rights. The statute is a declaration of public policy by the general court respecting one aspect of casualty insurance. It is a declaration as to a subject within its general power of regulation. It governs contracts made after it took effect. It is not retroactive. Its terms are reasonable and violate no right secured by the Constitution. It is well within the principle of numerous decisions where statutes are more or less interfering with the freedom of contract have been upheld.

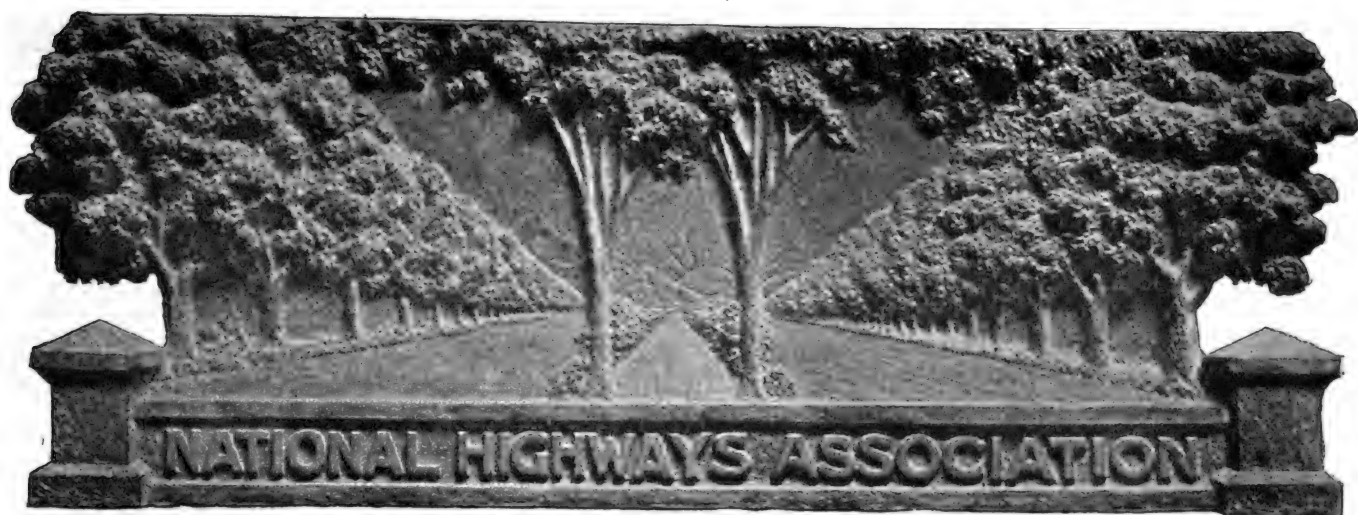
Order overruling the demurrer affirmed.

N. A. C. C. Takes \$50,000

Liberty Bonds.

At the October meeting of the National Automobile Chamber of Commerce which was attended by representatives of over 100 companies it was voted to subscribe to \$50,000 of the second issue of the Liberty Loan and also to carry bonds for the employees of the Association.

The members discussed the War Revenue bill as it relates to the industry and as it is interpreted that the intention of Congress in placing the 3 per cent. tax, that it be paid by the buyer of the car, it was the sense of the meeting that the amount of the tax should be added as a separate war item on each car and truck sold.



Early Registration Adopted in Massachusetts

THE Massachusetts Highway Commission is planning a decided improvement in its method of issuing registration number plates and certificates to motorists registering in Massachusetts. Heretofore the commission's offices have been overwhelmed with applications in December, January and February of each year, but this year the commission contemplates sending out a notice at once to the owners of the first 50,000 registered cars in 1917, to the 3000 or 4000 dealers and to the 25,000 owners of commercial

vehicles, giving them an opportunity to file their applications during November and December and of receiving their number plates and certificates in time for the attachment of the plates to the cars on the first day of year 1918.

This system will be a great improvement over that previously in operation and will be a considerable relief to the thousands of owners of motor vehicles of Massachusetts. Where this system, or a better one, does not prevail we recommend this improvement to motor vehicle commissioners generally.

and gravel roads. Running from Portland to Lewiston, a distance of 33 miles, are good dirt roads, and from which place one may follow the state highway to Augusta and on to Farmington, thence to Rangeley via Strong, Phillips and Madrid. This is the best route. There is a dirt road leading from Lewiston to Livermore Falls through to Rangeley via Farmington.

This route leads northward through the busy towns of Auburn and Lewiston, thence through the Maine woods, following up the Androscoggin valley to the lakes.

PENOBSCOT REGION.

Routes.

Houlton is considered a vast forest territory and affords good hunting; it is also one of the largest cities in Maine for hunters. Run from Bangor to Houlton, a distance of 116 miles of dirt and gravel roads, crossing the Kennebec stream to Veazie on to Orono, Old Town, Costigan, Olamon, Passadumkeag, W. Enfield, to South Lincoln, to Lincoln, Winn Mattawankeag, to Maswahoc, Linneus into Houlton.

ST. JOHN REGION.

Routes.

From Houlton, Maine, to Fort Kent, which lies in the most northern part of Maine, and which is thickly surrounded by forests and woods, provides good sport. It is a distance of 99 miles running through Littleton, Monticello, Blaine, Presque Isle, Caribou, Woodland, New Sweden, Daigle to Fort Kent.

This route covers narrow gravel roads, but the scenery is very beautiful, running as it does into and along the St. John river.

SCHOODIC LAKE REGION.

Routes.

We find that in and around Foxcroft, Maine, one can find accommodations for good hunting. The run is from Portland to Augusta via Auburn and Lewiston and then on to Newport via Vassalboro, Waterville, Fairfield, Benton, Pittsfield and on to Newport. You have then covered

HUNTERS' HORNS IN MOOSE LAND

Routes to the Great Maine Game Preserves and Where Non-Residents May Obtain Their Licenses.

THIS is the season when "the woods are calling" and "the horn of the hunter in heard on the hill," and to those motorists who enjoy the vast expanses of nature's great playgrounds—the hills and the forests, the lakes and the streams—we call attention to a few of the great game preserves in the State of Maine, as well as motor routes to them.

There are five principal chains or systems of lakes in Maine to which game is naturally attracted, namely, the Moosehead series, including Moosehead Lake, of about 120 square miles in area, the largest inland body of water in New England; the Rangeley series, consisting of some 90 square miles, drained by the Androscoggin river; the Schoodic, in the southeastern part of the state, drained by the St. Croix river; the Penobscot series, consisting of Shesuncook and its surrounding lakes on the west, and with Allagash, Chamberlain and others on the east; and the lakes that form the head waters of the St. John river and its tributaries.

Besides these there are, of course, a number of other game lands such as the Machias lakes section and the Caribou country and others.

MOOSEHEAD LAKE REGION.

Routes.

From Portland to Moosehead Lake, via Augusta, Belgrade Lakes and Skowhegan, is a very attractive trip and leads to good hunting grounds. The distance is 178 miles of good country roads; these roads are in fairly good condition. The route is very picturesque from Portland to Augusta, via Falmouth, Auburn, Lewiston to Winthrop, a distance of 64.5 miles. From Augusta to Belgrade Lakes is a short distance of 18 miles, thence to Skowhegan via Oakland and Fairfield Center, to Moosehead Lake via North Cornville, Athens, Harmony, Cambridge, Parkman, Guilford, Abbot and Monson to Greenville, which is the setting point there for the Moosehead Lake region.

RANGELEY LAKE REGION.

Routes.

From Portland to Rangeley Lakes is a distance of 130 miles, of fair to good dirt

a distance of 114.5 miles, and from which place run north to Cofinna and Dexter into Hazeltons Corners, keeping straight ahead to Dover. From this point one may take the dirt road which leads directly to Schoodic Lake, or follow the state highway to Foxcroft, in all covering 136 miles of dirt roads. Instead of following this route, which is of course all state roads, one may take the dirt road leading from Orono, northeast of Bangor, into Schoodic Lake.

MACHIAS LAKES REGION.

Routes.

Another good hunting section, other than the five mentioned, is the Machias Lakes region, which is one of the shore lying sections of Maine. Run along the coast from Portland, covering approximately 280 miles of macadam and dirt roads. From Portland to Bangor, a distance of 144.4 miles, keep straight ahead and along the coast via Falmouth, Yarmouth, Freeport, Brunswick, Bath, North Edgecomb, Damariscotta, Nobleboro, Waldoboro, Thomaston, Rockland, Rockport, Camden, Searsport, Prospect, Winterport into Bangor. From here run west into Brewer, East Orrington, North Ellsworth to Ellsworth, a distance of 28

miles, thence on to Machias, going through Hancock, Sullivan, Gouldsboro, Steuben, Millbridge, Harrington, Jonesboro to Machias, and from here to the various lakes in that vicinity. From here one may continue to Calais, making a total of 280 miles. This, of course, covering Washington county, showing the eastern points of attractive country. There are short cuts to Machias and Calais over dirt roads, but we advise members to travel the above route.

The Caribou country is considered a wonderful sporting section of Maine and the route is included in that of the St. John series to Fort Kent, going through the Aroostook county.

WHERE TO GET HUNTER'S LICENSES.

For non-resident hunting licenses:

Aroostook County, Maine.

Ashland, F. G. Webster, H. B. Barker & Co.; Benedicta, B. A. Gantner; Houlton, Elmer Churchill; Island Falls, Geo. H. Donham; Masardis, E. J. Mathews; Oakfield, F. H. Stimson; Oxbow, Libby Bros.; Presque Isle, H. R. Pipes; Smyrna Mills, J. E. Tarbell; Stacyville, O. Ross Brown; Stockholm, Lewis Anderson.

Penobscot County, Maine.

Bangor, Bangor House, A. H. Benner; Grindstone, J. L. Robbins; Millinocket, W. Herbert St. John; Norcross, A. F. Fowler; Old Town, W. C. Mutt; Patten, H. P. Gardner, E. F. Fowler, F. R. Bailey, D. L. Armstrong.

Piscataquis County, Maine.

Brownville, C. E. Herrick; Greenville, H. A. Sanders, Jr.; Greenville Junction, A. A. Crafts, R. W. Kittridge; Guilford, John Scales; Katahdin Iron Works, Mrs. A. L. Green; Kineo, C. A. Judkins; Kokadjo, W. I. Hamilton; Milo, Walter E. Dillon; Monson, Roy M. Hescok; Moosehead, A. J. Willson; Northeast Carry, T. B. Snow; Onawa, E. F. Drew; Sebec Lake, B. M. Packard, Schoodic, C. P. Reynolds.

Out of State Agents.

New York Sporting Goods Co., 15 Warren St., New York, N. Y.

Iver Johnson Sporting Goods Co., 155 Washington St., Boston, Mass.

Kirkwood Bros., 23 Elm St., Boston, Mass.

Wm. Read & Sons, 364 Washington St., Boston, Mass.

Bob Smith, 75 Federal St., Boston, Mass.

CREATION OF MUNICIPAL TRAFFIC BOARDS.

If there is one problem requiring very serious consideration in these United States of America it is the control and efficient regulation of traffic in our municipalities. Everywhere is heard the hue and cry against traffic congestion; and yet outside of one or two centres little or no attempt is being made to handle this problem in a big way such as these big municipal problems have been solved in the past.

It is gratifying, therefore, to see the city of New York taking up the matter in a serious manner, and it is hoped that other cities and towns may follow the example set by New York.

The plan is to create a traffic board or commission composed of experts in matters of traffic, who are empowered to investigate the entire traffic situation and develop and report comprehensive plans to meet present and future traffic requirements. It shall consider: (1) Traffic regulation and other means of increasing the capacity of existing streets. (2) Means of separating grades at important intersections, elevated roadways for through traffic, two-level streets, street widening and new streets. (3) A complete system of auto and trucking throughfares for the five boroughs with special reference to the linking up of the boroughs and to the linking up of the city as a whole with neighboring centres in Nassau and Westchester counties and in New Jersey.

Chalmers Beats the National Express.

A Chalmers Record Speedster beat the National Express, one of the fastest Baltimore and Ohio trains between Washington and Baltimore, over a three-mile course, a few days ago.

Emergencies---What They Mean

MOTORISTS are often confronted with meaning of the word "emergency," and it might be well for the average motorist to know just what the word means. According to the learned, it means a situation or unexpected happening or occasion for action, caused by a perplexing contingency or complication of circumstances. Motorists in every day life may not recollect this definition, but to the average motorist an emergency becomes clear when pedestrians or persons in vehicles find themselves in a perilous situation in consequence of their own or others failure to fulfill legal and moral obligation. They see it when pedestrians become frightened at an approaching machine, when they take the wrong course, when they run in front of automobiles, or hesitate, and seesaw after they have placed themselves in positions where injury seems inevitable.

The law that has come down to us from the learned English judges is that if I place a man in such a situation that he must adopt a perilous alternative, I am responsible for the consequences. On the other hand, if an injured person's act resulted from the rash apprehension of danger which did not exist, and the injury which he sustained is to be attributed to rashness and imprudence, such a person is not entitled to recover in damages.

Now what is the duty of a motorist in an emergency?

This is what one learned court has to say upon the law governing the drivers of motor vehicles:

"The law as to drivers of motor vehi-

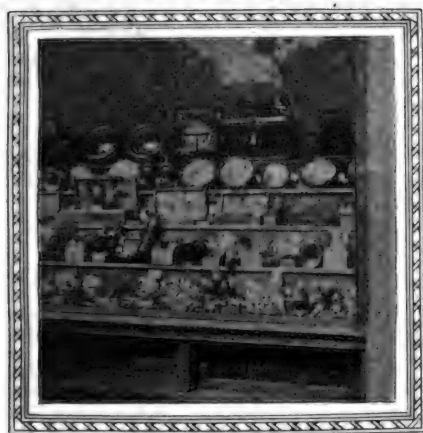
cles is no different from that which governs other persons. The standard required is that of a reasonable prudent person under all circumstances. If some unforeseen emergency occurs, which naturally would overpower the judgment of the ordinarily careful driver of a motor vehicle, so that momentarily or for a time he is not capable of intelligent action, and as a result injury is inflicted upon a third person, the driver is not negligent. The law does not require supernatural poise or self control. But no one safely can drive motor vehicles amid the distractions and dangers likely to be encountered on the modern highway and street who is not reasonably steady of nerve, quick in forming an opinion and calm in executing a design.

It is the duty of a driver always to exercise forethought, wisdom and caution.

It is his duty to anticipate that pedestrians and others in perilous situations might be filled with and overcome by fear and act unreasonably.

It is manifestly his duty to prefer the safety of human beings to that of animals, and to hit an animal rather than a human being, if the emergency demands such action.

It is his duty not to get rattled, and it is his duty to at all times operate his vehicle, not on the assumption everyone shall look out for him, but rather on the assumption that he shall look out for them, as more of a burden is placed upon him because of the character of the vehicle he operates than upon those not similarly situated.



Accessories Department



PERFECTION 5-IN-ONE VITALIZER.

An interesting device is being put on the market, designed for making the starting of an engine in cold weather an easy matter. This device is called the Perfection Five-in-One Vitalizer and may be attached to practically any gasoline engine.

The device comprises a combination electric super-heater, a primer, an accelerator and an exhaust heater and decarbonizer, all in one. The electric super-heater is controlled by a switch on the dash, draws current from the storage battery (or from four dry cells), and when turned on, instantly vaporizes a charge of gas for the engine, enabling one to start a cold engine very readily. The priming device is actuated by an arrangement which may be attached to the dash; the exhaust heater is had from the exhaust manifold through a flexible tube to the device.

The manufacturers sell the device under a broad guarantee and with the understanding that if it is not satisfactory it may be returned within 15 days from date of purchase and money will be refunded.

Manufactured by the Snyder Products Co., 4046 Washington Blvd., Chicago, Ill. Price \$10.

TOP BOW CLAMP.

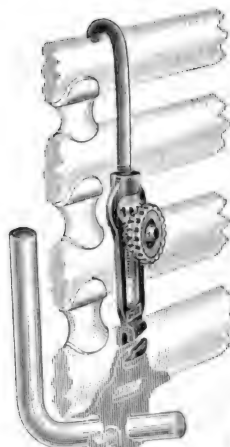
Every driver knows the aggravation caused by unusual knocks and noises about his car and does his best to keep them reduced to a minimum. Being subjected to so many varying stresses and strains, rattles and squeaks develop quickly, particularly where parts are subject to expansion, such as top holding straps, etc. To eliminate this trouble the Mosco Ford top bow clamp has been designed. This device hooks on to the bow brace and over the top of the bows when they are folded back. By means of a small hand wheel the tension on the bows may be increased and the bows held rigidly into place.

The manufacturers claim that no amount of shaking will force the holder from its grip, neither will it slip nor mar the finish of the bows.

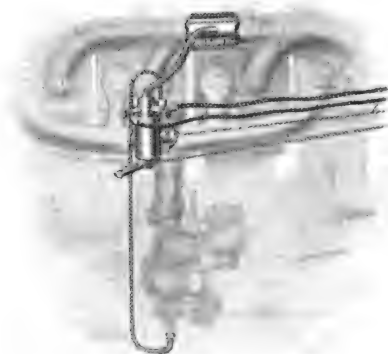
Manufactured by Motor Specialties Co., Waltham, Mass. Write for price and catalogue.



Workrite Combination Outfit.



Top Bow Clamp.



Perfection 5-in-One Vitalizer.

WORKRITE COMBINATION OUTFIT.

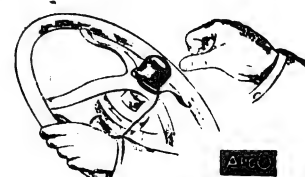
Few car owners realize the importance of their storage battery until it begins to give out. A frequent cause for battery trouble can be traced to impurities in the electrolyte, put in there from time to time as the battery is filled. The Workrite combination outfit of hydrometer and battery filler, together with receptacle for distilled water, is a very practical outfit for any owner or repair man having to do with storage battery work. The battery filler is fitted at one end with a rubber nozzle having a square shoulder, which prevents the device from rolling when placed on an inclined surface. The other end is fitted with a large bulb, which also acts as a stopper for the container bottle.

Direction for battery testing and practical suggestions for the care of the battery are printed on the label. It can be seen very readily that with ordinary care the chances of foreign matter getting into the battery electrolyte by way of the filler are small.

Manufactured by Workrite Manufacturing Co., Cleveland, O. Price for hydrometer and filler only, \$1; for combination outfit with bottle, \$1.50.

TWO NEW APCO SPECIALTIES.

Two new Apco specialties for the Ford car are just being put on the market. The first is a spindle arm anti-rattler or silencer, which is designed to prevent movement and rattling of the spindle arm bushing. The device consists of two heavy formed springs so arranged that undue movement of the spindle arm is prevented. It is neat and compact and



Two Apco Specialties.

can be quickly attached with the fingers. The device is packed in a box and when packed weighs two ounces.

The horn button attachment, which is designed to hold the horn button on the centre of the top of the steering wheel, as manufactured at present consists of a complete unit with button, and is finished in black enamel. When packed in a box its shipping weight is two ounces.

Manufactured by Apco Manufacturing Co., Providence, R. I. Price for anti-rattler, 40 cents a set; for horn button complete, 50 cents; horn button attachment without button, 25 cents.

B-W AMMETER.

Because the manufacturers of automobiles realize the importance of an ammeter in the electrical equipment, most modern machines are being fitted with such a device to indicate the passage of current to and from the battery. Many of the older machines do not have such a device, however, and, where possible, it is advisable to install one. The B-W Ammeter has a case of drawn brass, either nicked or finished in black rubberoid. It is supplied in either surface of flush type. The glass is held in place with a special baked cement which the manufacturers claim will not crack. The movement is said to be practically vibrationless, that is, not effected by engine or rough road jars. It is of the permanent magnet iron vane type and has no moving coils or fine hair springs.

All of the parts are of relatively large dimensions. The scale is of the usual etched metal finish and several different finishes are optional.

Manufactured by the Ballman-Whitten Manufacturing Co., 2867 Gravois Ave., St. Louis, Mo. Write for prices.

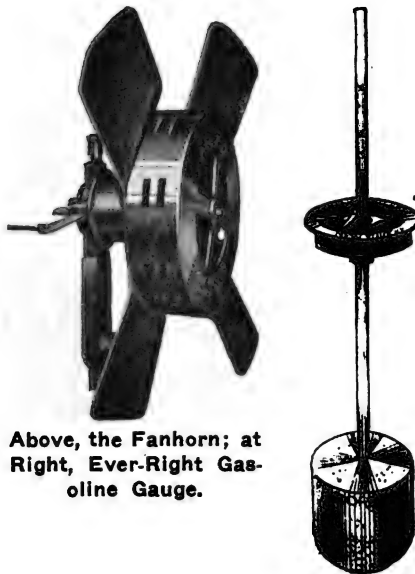
EVER-RIGHT GASOLINE GAUGE.

The Ever-Right Gasoline Gauge for Ford cars is a device designed for indicating the amount of gasoline in the tank at all times, and obviates the necessity of using a dirty stick or ruler. It is so arranged that the cork bobber and indicator rod is held flush with the top of the tank by a swivel catch. When it is desired to find the gasoline height the swivel catch is moved to one side, allowing the indicator rod to slip up through the cap. Notches in the rod indicate the amount of gasoline in the tank.

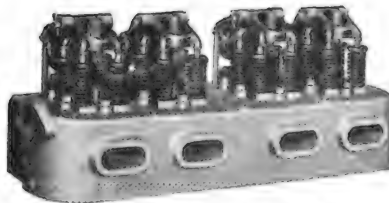
Manufactured by Ever-Right Products Corp., Broadway, at 57th St., New York. Price \$1.

HOOSIER PATCH.

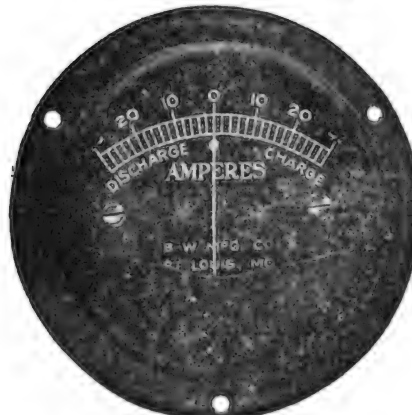
A handy repair patch is being put on the market under the name of Hoosier Patch. This article is designed to make a quick repair without the use of heat or gasoline, and the manufacturers claim that a repair made with this patch is practically permanent. They claim that the vulcanizing operation is accomplished by the heat arising from the friction of the tire when in use. With the outfit illustrated is included one patch, together



Above, the Fanhorn; at Right, Ever-Right Gasoline Gauge.



Peugeot Type Cylinder Head.



B-W Ammeter.



Hoosier Patch Outfit.

with sand paper and patch solution in a self-sealing tube. In outfit No. 1 the patch contains 108 square inches; in outfit No. 2 the patch contains 54 square inches.

Manufactured by Hoosier Rubber Manufacturing Co., Inc., Starks Bldg., Louisville, Ky. Price of outfit No. 1, \$1.75; outfit No. 2, \$1.

THE FANHORN.

A unique, new device of warning signal has just been put on the market which is said to be different from every other warning. The Fanhorn, as this distinctive type of signal is known, is designed to emit tones whose volume and penetration is in direct proportion to car speed. This result is achieved by the simple expedient of making the Fanhorn a part of the engine fan, in fact, the entire device is merely substituted for the present fan on any car, with no other alterations.

The tone of the Fanhorn is best described as a cross between a whistle and a whoop, both pleasing as well as commanding, and the pitch changes with the engine or car speed. The position of this new type of signal at the extreme front of the engine compartment avoids obstructions to the sound.

The horn is worked merely by pressure upon a button, which admits air into the apertures on the fanhorn drum, setting in motion an internal, revolving slotted disc, which causes the tone.

The manufacturers guarantee the material and workmanship of the new signal for a full year, and stand back of the dealer on a broad money back if not satisfied policy.

Manufactured by the Art Metal Manufacturing Co., Cleveland, O. Write for prices.

UTILITY VARNISH RENOVATOR.

A varnish renovator and cleaner, applied by the spray method, which is highly desirable both to the garage owner and car driver, is known as the Utility Varnish Renovator. The manufacturers claim that this cleaner will remove road tar, and that it contains no chemicals that will damage the finish in any way, being non-acid and non-alkaline.

The manufacturers make an attractive proposition to dealers and request that they write for particulars and prices.

Manufactured by Poughkeepsie Utilities Corp., 36 Winnikee Ave., Poughkeepsie, N. Y.

PEUGEOT TYPE CYLINDER HEAD.

For the owner who is remodeling his Ford car for speed work, the Peugeot type of cylinder head illustrated should make an attractive proposition. This cylinder head is made of a special grade of semi-steel nickel plated and water jacketed, and fitted with 16 overhead valves, which open directly into the explosion chamber and are operated through push rods, which extend to the regular Ford tappets. The design is such

that the spark plugs are located in the centre of the combustion chamber.

All holes in the cylinder and manifold are Ford standard, therefore no drilling or tapping is necessary. The application of this head is very simple and the makers claim an increase of approximately 100 per cent. horsepower and much gasoline efficiency.

Manufactured by Roof Auto Specialty Co., Anderson, Ind. Price \$85.

HUDSON TYPE CYLINDER HEAD.

A new cylinder head for Ford cars has just been put out on the market which should be an interesting fitting for Ford owners desiring to secure more speed and better combustion. This cylinder head, which may be interchanged with the standard Ford head in but a short time, is built of cast iron and constructed with an extra large water jacket holding approximately half a gallon more water than the standard head. The water jacket completely surrounds the spark plugs, thereby keeping them cool at all times. It is said that better water circulation is secured because of the increased water passage size. The largest part of the combustion chamber is directly over the valves, while the inside is perfectly smooth.

It is said that with this new cylinder head, there is a noticeable increase of power, and that there is a saving of fuel.

Manufactured by Green Engineering Co., 34 S. St. Clair St., Dayton, O. Write for prices and literature.

H-M METAL RADIATOR COVER.

A handy device for the winter motorist is illustrated herewith and called the H-M Metal Radiator Cover. This device is made of sheet metal divided into eight adjustable shutters operated as one from the dashboard. It is attached to the radiator with springs, assuring a tight and non-rattling fit at all times. The cover may be entirely closed, half, three-quarter, quarter closed or entirely open, depending upon weather conditions.

It is said that it is staunchly constructed and may be used many seasons.

Manufactured by the H-M Manufacturing Co., Indianapolis, Ind. Write for prices and descriptive literature.



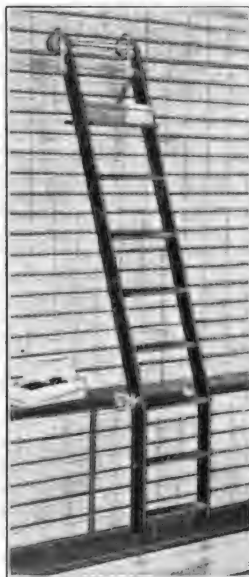
H-M Metal Radiator Cover.



Automatic Light Control.

MILBRADT STEP LADDERS.

In a garage, supply station, accessory store or stock room it often happens that many of the articles frequently used are packed high upon the shelves or in drawers,



which are above reaching distance. A rolling step ladder such as is shown in the illustration is an extremely handy part of the equipment and fully as important as the shelves themselves, if the saving of time is any object. The Milbradt rolling step ladders are made in many styles and to fit practically any shelf or drawer arrangement. They are made to order of hard wood lumber (usually oak), nicely finished with suitable fixtures at the top and to run on either steel or wood track.

They may be had to roll on the floor or against the side of the shelves, and it is said that a slight push will propel a ladder the length of an ordinary store, even with the operator on it.

Two styles of track are used, wood upon which rolls iron wheels, or steel track upon which rolls paper filled wheels. In either case the fittings are so arranged that the wheels cannot jump the track.

Manufactured by Milbradt Manufacturing Co., St. Louis, Mo. Write for prices, giving sketch and dimensions of ladder required.



Mosco Valve Grinder.

MOSCO VALVE GRINDER.

Every repair man realizes that to get good results valves must be ground into place properly. This means that the valve be turned back and forth and complete rotations carefully avoided. This operation requires both considerable skill and much patience. To accomplish this operation the Mosco Valve Grinder has been designed. The workings of this device is extremely simple. As the larger part of the grinder is held in place the handle at the side, which is attached to a chain coiled on a pulley inside the casing, is pulled slightly. This motion imparts a rotating motion to the valve tool and the makers claim a noticeable increase in valve grinding time. The device is fitted with two tools, one standard, the other for Ford valves.

Manufactured by Motor Specialties Co., Waltham, Mass. Price \$1.75.

AUTOMATIC LIGHT CONTROL.

In practically every state of the Union, there exists laws which require automobile head and tail lights to be lighted at dark, imposing fines upon those who do not comply with the law. If the automobile is parked upon the street, this means, that the owner or operator must take the time to go out and light his lights, or have them lighted. To obviate this the Semco Automatic light control has been designed. This device consists of an indicator dial which is marked with twelve numbers denoting the twelve hours, and fitted with two hands. When the operator wishes the lights lighted at a certain time, he turns the knob until the hands indicate the proper time. At the setting of the device, a plunger starts working and at the predetermined time electrical contact is made, lighting the lamps.

Manufactured by the Standard Electric Mfg. Co., 846 Massachusetts Avenue, Indianapolis, Ind. Write for prices.



Hudson Type Cylinder Head.

PLATE XI.

GARAGE WITH SHOP FOR THE HOME MECHANIC

**Easily Erected Structure Will Take Four Cars Under Its Roof
and Has a Separate Section For Repairing Equipment.**

Designed by the Architectural Department of The Automobile Journal Publishing Co.

MANY motorists with a mechanical trend of mind have cherished in their hearts a wish for a little garage where they have their own repair shop and do all their own work, as well as a little on the side for neighbors. Such a structure can be erected much cheaper than one would suppose, and the one made the subject in the architectural department this issue provides ample space for four cars, enabling the owner, if so inclined, to secure a sufficient income from his investment to pay for housing his own car, as well as interest, and also the overhead for his machine shop.

In small communities, or in the suburbs where there is considerable work for a mechanic on cars, but not sufficient to warrant the maintenance of a permanent repair shop and garage, such a structure with its equipment is an excellent investment for the man who can repair automobiles for himself and others.

The building is of a permanent substantial type, but not costly to erect or maintain. On a concrete foundation 33x25 feet, set in the ground about 3½ feet and extending above level about six inches, a wooden frame is erected of 4x6 sills, 2x4 studs, 4x4 plates and 2x10 rafters. The frame is boarded in with novelty siding and the roof covered with ¾-inch boarding on which a Rubberoid roofing is laid. A brick chimney with cement capping is shown. This rises at the rear end of the building and from the boiler room. The front of the building, containing two openings, each eight feet wide and closed with two swinging panel doors set with window sashes in upper panels, is carried up above the peak of the main roof at the centre and is shouldered off to the ends. The false part of the front is made of wood and put on to improve the appearance of the building, as is also the girting and sawed rafter ends.

A concrete floor is laid at grade and for a depth of several inches below and before it is laid provision should be made for the entrance of the various pipes and conduits that are necessary in establishing the drain and feed connections for the water and lighting systems. The base of the floor may be laid of the same coarse mixture used in the foundation walls, but it should be surfaced with at least an inch of smooth cement.

A closet and sink are installed in the garage part and in the rear, occupying a space 12x16 feet, is the machine shop, boiler room and toilet.

As shown by the plan the room is laid out for the convenient installation of a lathe, work bench, upright drill and emery wheel stand. The work bench sets beneath the three windows in the rear and the lathe under the battery of four windows on the side giving ample light in the day time.

Ample space is allowed on the floor between either wall and the lathe for the placing of a gasoline engine for power, or above the lathe when an electric motor is used. The extremely large entrance to the machine shop permits the running of an automobile into it for special repairs.

With this arrangement, lifting devices, such as chain falls, block and tackle, etc., may be suspended from the machine shop roof and used for removing engines and transmissions from cars and for lifting heavy parts into and from the lathe and drill press, thus obviating the necessity of having similar apparatus in the storage room.

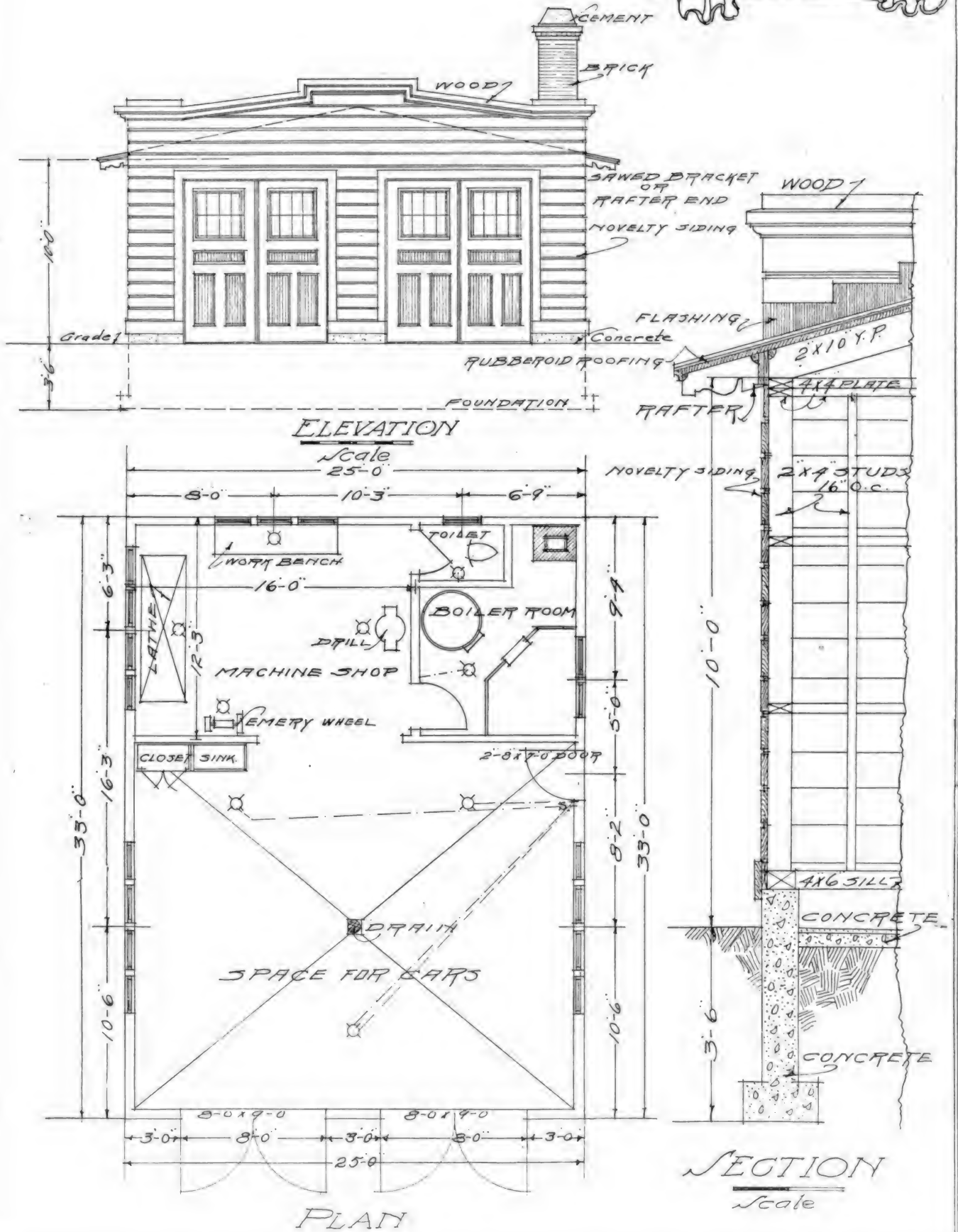
The boiler room is amply large for installation of a small heating system, using either steam or hot water, and provides for a commodious coal bin. For a practical garage and repair shop an efficient heating system is very essential and will pay for itself many times over in keeping the cars in order, as well as in comfort and satisfaction to the owner. It will also aid the owner in securing customers, as any owner prefers to have his car in a comfortably heated garage in the winter, as he knows it is secured against all the ills of freezing and that when he wants to use it in the morning he will not experience any of the troubles resulting from permitting car to stand in low temperatures. With a drain in the centre and an overhead water pipe to feed the washing hose, the owner can give the same service as can be obtained from the most pretentious garage.

When casting the floor it is a good plan to have the dimensions of the bases of the lathe, emery wheel and drill so that timbers can be sunk into the wet cement in the proper places to receive the lag screws with which these machines are held in place.

The entire structure can be erected by a carpenter and mason, excepting the doors and window frames and sashes, which can be purchased cheaply from a supply house.

With the materials purchased at prevailing prices and excluding the equipment, this garage may be erected for \$250 to \$400. Materials were purchased this fall in Rhode Island for a counterpart of this garage for \$290.

PLATE XI



USED CAR PRICES SHOW DIRECT SALES METHODS

Current Quotations Indicate Increased Activity in the Trade and Evidence of Increasing Disregard of Set Price Schedules

IN ALL of the eastern cities where there are large dealers in used cars there has been a noticeable increase in the activity of the trade. The dealers are adopting active methods in handling the cars and all the leading ones have special features in connection with their sales, while others have branched out from the want ad pages into the regular automobile sections.

One New York dealer predicts higher prices for used cars in his advertisement, making the following statement:

"Because of the increased cost of material prices are rapidly rising on new cars. Prices will advance in the near future on all used cars. You can buy a good used car right now and have a year's use of it and get almost as much as you paid for it at the end of that time."

A big Boston dealer offers to give a Liberty Bond with every used car purchased from him, while many of the dealers in that city offer to take the bonds in payment for cars and offer them on easy terms.

In Providence one of the agents who has a big used car department, attaches a coupon to his advertisement which is good for 35 hours free labor on any used car purchased during the week of Oct. 21-27. This labor will be furnished absolutely free to cover two months from date of purchase. In explaining this offer the advertisement states:

"In other words, we are guaranteeing these cars on repair work. This is something never attempted before in New England and demonstrates that we are handling nothing but the very best standard high grade used cars. These cars

are good cars or no dealer could attempt to do it." During the week of Oct. 15-20 the Packard dealers throughout the country held a used car show, following out a plan formulated by the Packard Motor Car Co. at Detroit. Each agent and dealer was sent a 16-page prospectus outlining the plan of the show and the method of getting the business. The use of the following advertising mediums was suggested to the distributors, muslin advertising banner, newspaper advertising (both display and classified), newspaper publicity, direct by mail advertising, street car advertising.

Suggestions were also made as to show room arrangement, window display, salesmen's appearance, muslin flag for show room, car tags and making of reports for the purpose of following up all prospects.

Evidence is daily coming to light from all parts of the country showing that the dealers are awakening to the necessity of handling the used car with the same direct sales methods that are used in disposing of new cars, and the success being met with is helping the sales of new cars by keeping an excess of used cars off the market and maintaining a higher value for them.

Some dealers are taking Liberty Bonds at a premium of two per cent. and it is the general practise to sell on easy terms.

Many dealers are finding an outlet for used cars by turning them into commercial delivery wagons with one of the many truck forming attachments that are now on the market.

Following are some of the used car advertisements appearing in the New York, Boston and Providence Sunday papers:

NEW YORK.

1917 STUTZ Touring.
1917 MARMON Touring.
1917 H. A. L. Touring.
1917 SCRIPPS-BOOTH Roadster.
1917 MITCHELL Touring.
1917 CHANDLER Chummy Roadster.
1917 MERCER Raceabout.
1917 DODGE Touring.
1917 PAIGE FAIRFIELD Brougham.
1917 OVERLAND Sedan.
1917 OVERLAND Limousine Brougham.
1917 STUDEBAKER 6 Limousine.
1917 STEARNS 8 Sedan.
1917 STUTZ 16-valve Roadster.
1917 WILLYS-KNIGHT Boat Special.
STEARNS 4-cyl. Landulet.
FIAT 6-cyl. Limousine.
VAN DYKE AUTO CO., INC.
1627 Broadway.

An Unusual Used Car List.

1917 MERCER Sporting "4."
1917 STUTZ Bulldog Special.
1917 STUTZ 16-valve Speedster.
STUTZ H. C. S. Baby Speedster.
1917 HUDSON 4-passenger Speedster.
1917 CADILLAC Landulet.
1917 CADILLAC Victoria.
1917 CADILLAC Roadster.
1916 CADILLAC Limousine.
1916 CADILLAC Touring.
1917 LIBERTY Touring.
1917 SCRIPPS-BOOTH; never run.
1917 HUPMOBILE Sedan.
1916 OLDSMOBILE Coupe.
SCHOONMAKER & JACOD.
1700 Broadway.

Bargains in Used Cars.

1917 STUTZ Sedan, special body, wire wheels.
1917 CHANDLER "Chummy" Roadster.
1917 SCRIPPS-BOOTH Roadster; new; bargain.
1917 KISSEL Town Car.
1917 PAIGE "Light 6" Touring.
1917 CHANDLER Touring; like new.
1917 DODGE Touring; almost new.
1917 MITCHELL "6" Touring; special job.
1917 STUDEBAKER "4" Touring, \$550.
1916 CHANDLER Brougham, wire wheels.
1916 HUDSON Super-6, Cabriolet.
1916 CHANDLER "6" Sedan, like new.
1916 KISSEL "6" Sedan, perfect.
1916 HUDSON Touring, Victoria top.
1916 CHANDLER Special Limousine.
1916 MERCER "Sporting 4," wire wheels.
1915 S. G. V. Touring; special job.
BENJ. R. RIPPEETH CO.
1776 Broadway, at 57th St.

1917 STEARNS Limousine.
1917 HUDSON Town Car.
1917 STUTZ 6-valve Speedster.
1917 HUDSON Sport Model.
Series "18" STUDEBAKER Roadster.
1917 LEXINGTON Touring.
1917 MITCHELL Town Car.
1917 CHALMERS Town Car.
1917 PAIGE Sedan.
1917 STUDEBAKER Cabriolet.
1917 SCRIPPS-BOOTH Roadster, Model G.
SCRIPPS-BOOTH Coupe.
Series 1917 STUDEBAKER, \$575.
1917 MITCHELL Touring.
1916 WILLYS-KNIGHT Coupe.
1916 MERCER Runabout.
1916 WHITE Touring.
1916 BUICK Limousine.
1916 OVERLAND 6-cylinder.
1916 SCRIPPS-BOOTH.
1916 KISSELMAR, Victoria Brougham.
NEW YORK MOTOR CAR EXCHANGE.
237 West 55th St.



SOUTH AMERICAN CORN TRAIN LEAVING THE FIELDS.

Argentina, Like the United States, Is Sending Millions of Bushels of Grain to the Allies, Which the Perfection of Automotive Traction Alone Makes Possible. The Trailer Train Here Shown Is Drawn by a Twin City 40 Horsepower Tractor, Carrying 44 Tons of Corn from an Argentine Ranch to Market.

PROVIDENCE.

6-48 PIERCE-ARROW Limousine, \$1500.
 1916 REO 6-cylinder Touring, \$675.
 1913 REO 4-cylinder Touring, \$550.
 1915 DODGE Touring, \$500.
 1916 DODGE Touring, \$550.
 1916 COLE Touring, \$1150.
 1915 REGAL Touring, \$250.
 1916 OVERLAND Touring, \$475.
 1916 OVERLAND TOURING, \$525.
 1914 OVERLAND Touring, \$300.
 1914 BUICK Touring, \$435.
 1915 CADILLAC Coupe, \$1500.
 1917 OLDSMOBILE Coupe, \$1350.
 1914 CADILLAC Touring, \$580.
 1912 CADILLAC Touring, \$275.
 1913 CADILLAC Touring, \$400.
 1912 CADILLAC Coupe, \$400.
 1916 OLDSMOBILE Roadster, \$600.
 1915 OLDSMOBILE Touring, \$550.
 1917 FORD Touring, \$300.

CADILLAC AUTO CO. OF R. I.

1917 OAKLAND Touring car; run 500 miles; better than new; with extras, \$690.
 DODGE Touring car; in fine shape; tires and paint like new; others ask \$650; our price \$490.
 CHEVROLET Touring car; like a new car; run very little; very low price for quick sale.
 1917 and 1916 OAKLAND Touring cars; these should go fast at 20 to 40 per cent. off list price.
 FORD Touring cars; prices very low.
 STUDEBAKER Six Touring; 7-passenger; electric starter and extras; \$690.
 1916 OLDSMOBILE "4" Touring car; a car that has had the best of care by female owner; was \$850; price now \$690; \$350 cash, balance easy.
 1916 BRISCOE Touring car; new paint, good tires; just the car for salesmen; was \$475; now \$390.
 FIAT; small model touring car with lot of extras; good condition; a \$5000 car; our price \$800.
 AMERICAN SCOUT; in good order; paint and tires good; sold under guarantee; our low price \$490.
 KING 8-cylinder Touring car; like new; in fine condition; a bargain; \$750.
 1916 SAXON Six Touring; like new; thoroughly overhauled; a snap at \$550.
 COLE 6-passenger Touring car; in fine order; a snap at \$590.
 OVERLAND Roadster; a model that is in great demand; guaranteed 3 months; price down to \$325.
 NATIONAL 4-passenger sport car; cost \$3200; electric starter and lights; 2 new tires; rest of tires good; A1 condition; new paint; purple with white wheels; a stunner; rebuilt; price down to \$1200.
 Guaranteed OVERLAND Touring car; 5-passenger; in fine condition; guaranteed to Jan. 1; \$350.
 MAXWELL Touring car; fine order; like a new car; if sold by Wednesday, \$390.

PUGH BROS. CO.

53 Mathewson St., Providence, R. I.

1917 OAKLAND Touring; little 6-cylinder; 32x4 tires; run 5000 miles.
 1917 FORD Runabout; like new; come early if you are interested in the car.
 1916 COLE 8 Touring; overhauled and painted; 7-passenger and fine car for rental or private family.
 1916 BUICK 6; little 6-cylinder touring; 22x4 wheels; this popular car will sell quickly; so call early.
 Winter Tops; 1916 Dodge Top, 1916 Oldsmobile top; cheap.
 1915 CADILLAC 8 Touring; 7-passenger; overhauled and painted, motor rebuilt, all new Goodyear cord.
 1916 OLDSMOBILE 4 Touring car; run 5000 miles; 33x4 tires, non-skid shoes all around.
 1916 OLDSMOBILE 8 Touring; a very quiet motor; a nice, light, easy riding car.
 1916 DODGE Touring; Delco system, large brakes, latest clutch; also winter top.
 1915 REO Touring; a light weight family car; 18 miles to a gallon of gasoline.

W. MULRY.

97 Empire St., Providence, R. I.



ADVANCED IDEAS IN TRAILERIZING WITH CAR CHASSIS.

Five-Ton King Semi-Trailer Body Used with a Converted Ford Chassis as a Tractor with Heavy Haulage in Michigan. The Coupling Compensates the Stresses from Ruts. The Universal Shock Absorbing Fifth Wheel Has a Hub Iron That Runs on a Circular Track, Insuring Stability at Practically Any Angle.

\$100-\$400.

BUICK Light Four Touring; paint and mechanical condition fine.
 BUICK Light Four Roadster; paint and mechanical condition fine.
 BUICK Touring; model 17; a very powerful car; price low.
 CADILLAC Touring; in good running order; a bargain.
 1916 STUDEBAKER Touring; paint and mechanical condition good.
 POPE-HARTFORD Touring; 6-cylinder; in fine shape.
 OVERLAND Touring; last year's model; paint and mechanical condition good.
 OVERLAND Touring; model 69; in good shape; price low.

\$450-\$750.

FIAT Limousine; a fine rental car; in good running order.
 1915 BUICK Touring; model C 37; in fine condition.
 1915 BUICK Touring; light 4-cylinder; fine condition; big gasoline mileage.
 1914 CADILLAC Roadster; a powerful, reliable car; in fine condition.
 BUICK Touring; model 43; fine condition; you can depend on this car.
 STUDEBAKER Coupe; 6-cylinder; in fine condition.
 BUICK Light Six Touring; rebuilt and refinished; Goodyear oversize tires.
 LOZIER Limousine; two of these in fine condition; just the car for the rental man.
 PIERCE-ARROW Sedan; 6-48; price low.
 BUICK AGENCY.

235-237 Broad St., Providence, R. I.

BOSTON.

MERCER 1914 Touring; refinished like new; has many extras; trades considered.
 1916 FORD Touring; will sell at a bargain.
 BUICK C 25 Touring; one of those nice small cars everybody wants.
 BUICK Racer; small 2-passenger sport car; will be sold cheap; newly painted and rims good.
 FORD Roadster; in nice running order; sell very low at once.
 FORD Panel Truck; sold very cheap; owner purchasing a larger truck.
 STUDEBAKER Coupelette; just like new; owner going to war.
 KELLEHER AUTO CO.,
 8 Columbus Ave., Boston.

1917 HUPMOBILE Touring; wire wheels; special 7-passenger.
 1917 PULLMAN Roadster; nearly a new car; factory guaranteed.
 1917 MAXWELL Sedan; like new.
 1917 PEERLESS 8-cylinder Touring; slightly used.
 1916 FIAT Touring; 7-passenger; wonderful shape.
 1917 CHEVROLET Roadster; nearly a new car.
 1917 MAXWELL Touring; two to select; factory guarantee.
 1916 SAXON Roadster; newly varnished; guaranteed.
 1917 BUICK Roadster; practically new.

1917 OVERLAND Roadster; excellent run-about.
 1915 CADILLAC, 8-cylinder Roadster; in the best of condition.
 1916 PAIGE Roadster; best condition possible.
 1916 STUDEBAKER; 7-passenger, 6-cylinder; chance to purchase low; newly varnished.
 1914 DELAUNEY; Bellville limousine, 7-passenger, guaranteed, very economical limousine car.

PARK SQUARE USED CAR CO.
12 Columbus Ave., Boston, Mass.

1917 PAIGE Light Six; almost new; must be seen to be appreciated; car run 3200 miles; fully guaranteed.
 1917 VELIE; 7-passenger; big six; almost new; at bargain price.
 1916 HUDSON "Super Six;" 7-passenger; fast and powerful; guaranteed the best of condition.
 1916 OLDSMOBILE "8;" 5-passenger; comfort and plenty of pep; very sporty.
 1916 DODGE Roadster; like new; low mileage.
 1915 OVERLAND; model "80" Roadster; the best they ever built.
 1914 CADILLAC; 7-passenger; newly painted and overhauled; the car for renting.
 1915 CHANDLER Touring; make offer; in fine condition.
 1916 CHANDLER Roadster; roomy; an ideal car for salesman.
 1916 MAXWELL Roadster; slightly used; in perfect condition.
 1916 FORD Coupe; shock absorbers; 31x4 tires; demountable rims; lots of extras; nearly new.
 1912 HUDSON "33" Touring; electric lights and looks classy; guaranteed.
 METROPOLITAN USED CAR CO.
 16 Columbus Ave., Boston, Mass.

\$400; PULLMAN Chummy Roadster; in excellent condition and fully equipped.
 \$600; 1916 MITCHELL Six Touring car; seven; in A1 condition.
 \$350; 1915 PAIGE; 4-cylinder Touring car; in excellent condition; has had the best of care and looks and runs like new.
 OLDSMOBILES, OLDSMOBILES; \$500; your choice of 20; 1916 Oldsmobile 4-cyl. Touring cars; all like new; tires and paint perfect; get 20 miles on a gallon of gasoline and are very economical to run; they are fully equipped; call for demonstration.
 \$435; STUTZ Touring car; good condition.
 \$275; 1915 FORD Town car; in good condition.
 \$285; OVERLAND Coupe; only been driven 4000 miles and is like new; tires and paint perfect.
 \$300; CADILLAC Coupe; in good condition.
 \$135; METZ Roadster; in good condition.
 \$90; METZ Roadster; good running order.
 \$250; Roadster; 4-cyl; in excellent condition; electric lights; two extra tires and many extras.

LANGHAM MOTOR CAR CO.
162 Columbus Ave., Boston, Mass.

Guides on the Automobile War Tax Rules

The National Automobile Chamber of Commerce, through Alfred Reeves, General Manager, has announced that through courtesy of officials of the United States Treasury Department it has secured certain rulings relative to provisions of the war revenue act as it affects the automobile industry. These are set forth in the following bulletin. Statement is made that these are tentative and subject to changes, but they will serve to guide the manufacturers and dealers until official and formal rulings are promulgated, possibly before the end of November, when the taxes must be paid:

1. **Manufacturers' Tax**—Manufacturers selling new automobiles, including trucks, on and after Oct. 4, 1917, pay a tax of three per cent. on the manufacturer's selling price.

2. The tax is levied on the price the manufacturer receives for the car—not the list price, unless actually sold for that. When the price is paid part in money and part in other considerations (a second-hand car), the tax is levied on the price and not on the actual cash received.

3. **Charging the Tax to Consumer**—If the manufacturer passes the tax on, the Treasury Department believes that the price the manufacturer gets for the car (which is the basis for the tax), should include the present price of the car plus the tax collected. For example, if the manufacturer sells the car for \$800, plus the war tax, \$24 (or makes his selling price \$824 with no reference to the tax), the government will assess the tax of three per cent. on \$824, which is what the manufacturer receives in making the sale. Thus for the manufacturer to receive the full \$800 for his product plus the war tax, his billing price would have to be \$824.74, of which three per cent. or \$24.74 would be paid to the government, leaving the manufacturer his \$800 net. The manufacturer's present price, would, therefore, be 97% of the total charge to the customer. This would appear to be a tax on a tax, but the Treasury Department rules that the tax is on the gross amount the manufacturer receives in making a sale and the tax is a part of that amount, even though later it is paid over to the government.

4. **Floor Tax**—Wholesalers, or combined wholesalers-retailers, holding new automobiles, including trucks for sale at the opening of business Oct. 4, 1917, are taxed 1½ per cent. on what was paid to the manufacturer for the automobiles in question. However, the wholesaler, and wholesaler-retailer, are not taxed on automobiles sold and delivered prior to May 9, 1917, where title has been retained as security for payment of purchase money. The dealer who does a retail business and also a wholesale business is subject to the tax as a wholesaler on all the new automobiles held on Oct. 4, 1917, irrespective of whether they are subsequently to be sold at wholesale or retail.

5. **Second-Hand Cars Are Not Taxable**—The treasury officials finally reached the conclusion that second-hand cars are not taxable under the act, whether held by manufacturers or wholesalers.

6. **Chassis Taxed**—Chassis are considered automobiles and therefore are taxable.

7. **Contracts Prior to May 9, 1917**—The above taxes are collected from the seller of the car, except in the following cases: If the manufacturer, wholesaler or wholesaler-retailer, sell a taxable automobile to a dealer under contract made prior to May 9, 1917, then no matter what the contract has to say about the taxes, the dealer who buys the automobile must assume the tax and pay it over to the seller, who in turn will pay the tax to the government.

8. **Conditional Sales**—When an automobile was delivered to a purchaser prior to the date of the law, on a conditional sale contract by which the seller retains title to the automobile as security for the purchase money, then the sale is made when title is passed. Such a sale is taxable if a simple sale between the same parties on the same date is taxable. (See exception in paragraph seven, relating to sales before May 9th.)

9. **When an Automobile Is Sold**—The manufacturers' automobile tax accrues when the automobile or truck is sold. The question of when an automobile is sold is governed by the usual rules of law and of commercial acceptance, to wit: That the sale takes place when title to the merchandise passes to the buyer, that such passage of title may occur either by the physical transfer of the property or the bill of lading representing the same, to the purchaser or to the agent of the purchaser, and that, therefore, title passes when the merchandise is delivered to a carrier who is the agent of the buyer or the bill of lading is put in the mail (the postoffice being custodian of the purchaser), or when the bill of lading is delivered to the bank representing the purchaser.

10. **Chattel Mortgages**—Car delivered with a chattel mortgage is a sale when title passes and not when the mortgage is paid off.

11. **Selling Cars to United States Government**—The Treasury Department will probably rule that such automobiles or trucks can be relieved from the tax under section 3464 of the Revised Statutes. Under that provision of law the government has been purchasing, without levying any tax upon the seller, various articles which, in terms, are taxed under different internal revenue provisions of law.

12. **Procedure**—The seller, to avail himself of this provision, should, before he delivers the merchandise to the government, have the branch of the government which is purchasing the article make application to the Treasury Department for an order releasing these articles from the tax. Unless such order is obtained it would be necessary for the seller to add the tax to the cars or trucks sold to the government. Companies that have contracts with the government now for supplying merchandise without a provision for passing the tax should make the above application immediately.

13. **Sales to Foreign Governments Taxable**—Motors, cars or trucks sold to foreign governments are taxable. In the case of cars sold to foreign branches, where the branch is a separate identity, the tax accrues as usual when the sale is made to the branch; otherwise tax does not accrue until the sale is made by the foreign representative or agent of the manufacturer.

14. **Branch House Stocks**—If the so-called branch house is a distinct and separate corporation from a manufacturer's corporation, even though the manufacturer holds the majority or the whole of the branch corporation stock, then the manufacturer is not liable for any taxes incurred by the branch.

15. **Extras Shipped with the Car**—The Treasury Department rules on the question of extras, that when such extras are shipped with the car and make one sale, the manufacturer shall pay the tax on the full amount. If the car is shipped, regular, however, and a set of wire wheels purchased extra, or another body, such extras would not be taxed.

16. **Plan of Averaging the Tax so All Final Buyers Pay the Same Amount**—The Treasury Department does not look with disfavor on the plan of averaging the tax so that the amount of tax paid by the ultimate buyers of a certain type of car shall be the same, irrespective of the sliding scale of discounts allowed various classes of dealers. They agree that it would be fairer to the retail buyer. The

department is interested in the tax which the manufacturer pays on his car sales and not on the form in which he passes it to the ultimate consumer. To avoid misrepresentation the ultimate purchaser should not be billed with an item labeled "War Tax" unless it is the exact amount. There is no objection to the billing being marked "To Cover War Tax" and a sum charged on each car to go through all transactions, and the total of which at the end of the year will be approximately the amount which the manufacturer has to pay to the government.

17. **Don't Establish Improper Precedents**—To avoid establishing improper precedents in doubtful cases, inform party from whom you collect a tax that you are in doubt and that as soon as the government makes official rulings you will return any unwarranted collection.

18. **Making Reports**—In making return to the government, list all articles that are taxable and make payment thereon. On articles as to whose liability for taxes you are in doubt, make a separate return to the government stating reasons why you believe they are not taxable. Do not pay tax on this class unless ordered by the government. This policy will give the government all needed information, and will protect you from any penalties.

19. **Time for Paying Taxes**—Your local collector of internal revenue will supply information as to the time and mode of making returns and paying taxes. Wholesalers should make their returns on the floor tax, with checks covering the proper amount, before Nov. 2, 1917. The payment may be extended to a date not exceeding seven months from the passage of the act, upon the filing of a bond for the payment. This bond shall be in a penal sum of not less than double the amount of the tax and in no case less than \$1000. Your Liberty Bonds will be accepted at par, covering the amount of taxes involved instead of double as required if a surety bond is given.

20. **Manufacturers' Returns**—Manufacturers should make reports, with checks for the proper amount, on their October sales any time before the end of November. After that they make monthly reports.

General situations may be referred to us for the attention of our counsel or for submission to the Treasury Department, but specific cases, involving details of a particular transaction, should be first submitted to your own counsel with the papers.

Show Calendar

New York, national automobile show	Jan. 5-12
Washington, D. C., carnival and open house week	Jan. 11-18
Montreal, Can., national motor show	Jan. 19-26
Chicago, Ill., national automobile show	Jan. 26-Feb. 2
St. Louis, Mo., manufacturers' and dealers' show	Feb. 11-16
San Francisco, Cal., automobile show	Feb. 16-26
Boston, Mass., Boston Automobile Dealers' Association show, Mechanics' building	March 2-9



Final Operation in the Process of Mounting a Detroit Weatherproof Top on a Maxwell Car Body.

N. C. R. HOLDS SCHOOL FOR WIVES

President Patterson's Unique Idea in Sales Conventions Carried Out at Dayton with Interesting Program

NOTHING as epochal in the sales policy of big industries has been attempted as the recent convention held at the plant of the National Cash Register Co., Dayton, O., where the wives of the company's sales force were assembled to hear the inside story of selling cash registers. The idea was developed by John H. Patterson, president of the company, who believes that the efficiency of his great sales force of 500 odd men could be greatly stimulated by interesting their wives in their work by acquainting them with the company's policies, sales methods and service rendered business by the company's famous product.

The convention was held in the famous N. C. R. schoolhouse, and in addition to the addresses by the company's president and other officials there were a number of speakers of national prominence, including B. C. Forbes and Dr. Frank S. Crane, well known writers, and Mrs. Christine Frederick.

On the walls of the convention hall there were two big feature posters. One set forth the following rules for the wives:

"Ten things an N. C. R. woman can do:" (1) Serve simple food; (2) keep him cheerful; (3) give him plenty fresh air; (4) see that he gets plenty of sleep; (5) lend encouragement at the right time; (6) encourage him to take regular exercise; (7) be economical and save for a rainy day; (8) take a new interest in his sales record; (9) study merchants' needs and help husband with tips; (10) read N. C. R. advertising and call attention to important things.

The other poster, illustrated with a bag of money from which dollars were leaking, bore the legend: "Leaks in his earnings." And these were designated

as follows: (1) Spends too much time at home; (2) eats too much; loses energy; (3) does not use simple methods; (4) lacks ambition—self-satisfied; (5) does not cover his territory; (6) fails to study—lacks interest in business; (7) does not read and use advertising. Below was this suggestion: "You can help him stop these leaks."

During the sessions President Patterson made several speeches on salesmanship and how women can help their husbands increase their incomes. He illustrated his talks with graphic chalk sketches on large charts and Sales Manager Charles E. Steffey, who managed the convention, gave practical talks on salesmanship and business.

NEW YORK BRANCH OF "THE BEARINGS" CO.

The Bearings Co. of Pennsylvania, Inc., has opened a branch office in New York City at 1864 Broadway. A complete stock of bearings is maintained for the accommodation of the company's trade in the Metropolitan territory. A sales agency has also been installed at Newark, N. J., at 293 Halsey street, which is conducted under the direction of P. C. Christman, manager of the New York branch.

BILLING LIBERTY BONDS IN THE AUTO CITY.

Reluctant Patriot Discovers It Behind Mammoth "Buy a Bond" Sign.

Detroit—"They certainly bill this Liberty Loan like a circus," said the conductor of a Woodward line car on one early morning as he glanced out at the lithographs on a fence.

"Well, I'm tied up with coal bills and

a lot of new furniture," said a passenger who was riding in the rear of the car. "It would have to be a sign as big as a house to jar any bond money out of me just now."

The car had just left Forest avenue going south when he made his statement. "It would, eh?" broke in another passenger. "Well you just look at that." The car was passing the salesrooms of Thomas J. Doyle, dealer in Dodge Brothers motor cars. From the roof to the ground, 30 feet, and covering the entire front of the 111-foot building was a sign, "BUY A BOND." It was as big as two houses.

"You win," said the first passenger. "I'll buy."

DETROIT TOP A HELP TO WINTER MOTORING.

With the coming of winter the motorist is inclined to think of fittings for enabling him to utilize his car during the cold weather. A product which is attracting considerable attention is the Detroit Weatherproof Top, made by the Detroit Weatherproof Body Co. of Pontiac, Mich., for application to the Ford, Buick, Chandler, Chalmers, Hudson, Maxwell or Overland cars.

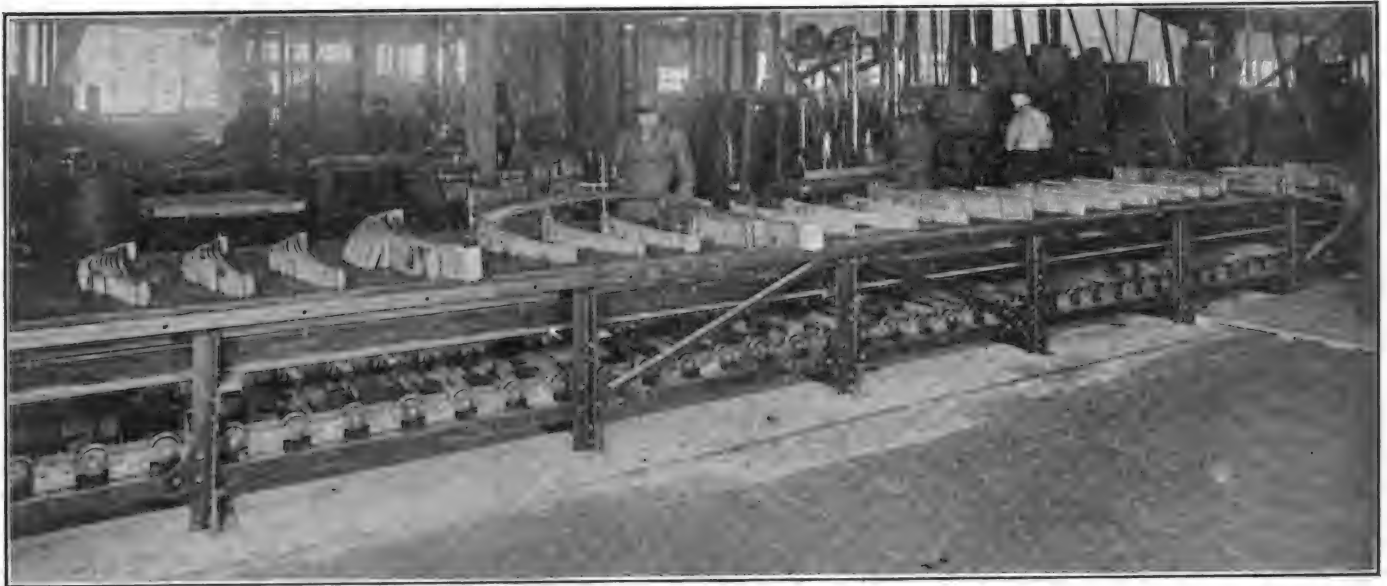
Windows and sash are special features in construction and service in this top. Windows are cemented into place by means of a black gum, which penetrates to every crevice and keeps the glass from squeaking or rattling.

All of the tops are made to order of the best material and carefully finished by hand work, then knocked down and crated with an assembly chart.

The company has also just announced the appointment of W. H. Taneyhill as its sales manager. Mr. Taneyhill was formerly general sales manager of the Scripps-Booth Motor Car Co., and his merchandising ability shows a rapidly growing demand for its product.



W. H. Taneyhill, New Sales Manager of the Detroit Weatherproof Body Co., Pontiac, Mich.



Grinding Spring Ends in the Factory of the Detroit Steel Products Co., Detroit, Mich., the Third of a Series of 12 Operations All Performed on a Movable Assembly and Inspection Platform Recently Installed.

The Business Side of the Motor Vehicle Industry

The Detroit Steel Products Co. announces bettered and increased production through the recent installation of a movable assembly and inspection platform. Possibilities of error are minimized with this platform, with which 40 tons of springs can be handled in a day. The work that previously required 40 men is now better done with 25. When the spring leaves have been collected the long plates are faced, this being the grinding of the curved loops at the ends to make them square and smooth. Then follows reaming the eyes. Here Detroit springs are reamed to 1/1000 inch and in perfect alignment with the backs. After the third operation the grinding of the spring ends, illustrated, these operations all take place on the platform: Polishing the backs and plates of the springs, riveting the spring clips, lubricating the spring leaves, first inspection for fit and to see that all leaves are turned in the right direction and are in the correct order, the "bull dozing" and capacity tests, placing and riveting the clip bolts and final inspection.

The King Motor Car Co., Detroit, Mich., which recently appointed Wallace C. Hood sales manager of the King Eight, has plans afoot for widening distribution. Mr. Hood retains his stock in the Wallace C. Hood service bureau, organized by him, which gives service to outside distributors and factories in facilitating of shipments of stock, and will continue.

The Moline Automobile Co., East Moline, Ill., has announced an increase in the price of the Moline-Knight model C touring cars and roadsters from \$1495 to \$1575, and the model G touring cars and roadsters from \$1840 to \$1950. The new prices become effective Nov. 10.

The Liberty Motor Car Co. of Canada, Ltd., has been incorporated at Windsor,

Ont., with a capital of \$10,000. The incorporators are Percy Owen, James F. Bourquin and Harland M. Worth of Detroit.

The Dodge Brothers have announced a new price schedule of their roadster, touring car, sedan and coupe, which will become effective on Nov. 1. The list, which shows an advance of \$50 on the open models and \$85 on the closed types, is as follows: Roadster and touring car, \$885; sedan and coupe, \$1350.

The Westcott Motor Co., Springfield,



Wallace C. Hood, Appointed Sales Manager of the King Motor Car Co., Detroit, Mich.

O., has announced a new price schedule which will become effective on Oct. 31. The new prices are as follows: Seven or five-passenger touring car, \$1790; four-passenger touring roadster, \$1790; seven or five-passenger convertible sedan, \$2690; four-passenger convertible coupe, \$2690.

The Victor Wire Wheel Co., Kalamazoo, Mich., has been organized with a capital of \$500,000 to manufacture a complete wire wheel, which will include its own patented Q. D. rim, hubs, spokes and nipples. An option has been taken on a 10-acre factory site, but a temporary factory has already been secured and production will start as soon as the machinery is installed.

The Chalmers Motor Co. has announced an increase in car prices to become effective on Nov. 1, and it will include the war tax. The new prices will be as follows: Roadster, \$1365; seven-passenger, \$1450. No change has been made in the prices of the other models.

The Seeger Mfg. Co. has been incorporated under the laws of Illinois with a capital stock of \$7400 to manufacture a coal burning heater for private or small garages. The company's main offices are located at 175 West Jackson boulevard, Chicago. The plant is at 1001 30th street, Milwaukee, Wis., where manufacturing operations were started some time ago.

Clarence H. Booth, president of the Scripps-Booth Corporation, has resigned. The company, it is reported, will pass into the hands of one of the large motor corporations and new models and prices will then be announced.

H. S. Firestone, president of the Firestone Tire and Rubber Co., Akron, O., estimates the company's business for the current year at \$60,000,000, as compared with \$36,000,000, the gross business done last year.

The Ross Automobile Co., which has been placed in the hands of receivers, may move to the Pacific coast when its affairs are straightened out, according to advices from Detroit.

The Hydraulic Pressed Steel Co., Cleveland, O., has purchased the Canton

Sheet Steel Co. of Canton, O. The deal involved \$4,000,000, of which half was paid in cash. C. A. Irwin, the founder of the Hydraulic Pressed Steel Co., will continue as head of all the properties, and it is understood will consolidate all the interest now controlled, which include the Cleveland Welding and Manufacturing Co.

The Stephens Motor Branch of the Moline Plow Co., Moline, Ill., has announced an increase in the price of the Stephens Salient Six from \$1385 to \$1485.

Holley Bros. are now manufacturing their carburetor in their own factory at Coventry, England. Over 120 men are employed and about 500 carburetors will be turned out weekly when full production is attained. The plant is under the management of T. C. Copson.

The Edison Storage Battery Co. has moved its New York sales office into larger quarters at 209 West 76th street, across the street from the old quarters at 206 W. 76th street. Many additional facilities have been installed at the new location to handle the increased business and give every customer the usual Edison service. The office is in charge of John Kelly.

The Commonwealth Finance Corporation of New York City has leased additional space in the 20th floor of the American Surety building, 100 Broadway, to care for the constantly growing volume of its business. The company has also opened an office at 323-4 Bulletin building, Philadelphia, Pa., under the management of L. M. Seiver. It is the largest capitalized financial institution specializing in automobile paper in the country.

James W. Florida, formerly assistant manager of the Philadelphia branch of the Locomobile Company of America, has been commissioned a major of infantry and is attached to the Motor Transportation Corps of the U. S. Army. He will be stationed in France.

Walter S. Cranmer, formerly connected with the Woods Motor Vehicle Co. of Chicago, has been appointed assistant manager of sales of the Philadelphia

Storage Battery Co., with headquarters at Philadelphia, Pa. For the past few years he has been in charge of sales for the company in the states of Pennsylvania, Delaware and New Jersey.

The Hyatt Roller Bearing Co., Detroit, Mich., announces several changes and promotions in a handsome album just issued of the staff of Hyatt Quiet Roller Bearings. B. G. Koether is the new manager of the Hyatt motor bearings sales division, H. G. Brown, Jr., sales manager, and R. E. Wells, engineer, was for-



E. H. Gilchrest, Newly Appointed Sales Manager of the Westcott Motor Car Co., Springfield, O.

merly with the American Gear and Axle Co. and Hupp Motor Car Co.

The Continental Motors Corp., Detroit, Mich., recently completed building additions and economizing features, including a five-ton crane installation.

The Westcott Motor Car Co., Springfield, O., announces the appointment of E. H. Gilchrest as the new sales manager of this company.

M. A. Middaugh, a well known dealer in hides, furs, vehicles and gasoline en-

gines at Towanda, Pa., has taken on the sale of Republic motor trucks.

The New Era Spring and Specialty Co. has discontinued its Detroit, Mich., offices and the general offices of the company have been consolidated at the Grand Rapids, Mich., factory. Jobbers' rush spring orders will be received at the spring factory, 717 Mather street, Chicago.

C. F. Redden, president and founder of the Redden Motor Truck Co., has resigned from the presidency of the company and disposed of his interests. Announcement is soon to be made of his plans to develop a popular farm tractor in which Mr. Redden has become interested and the formation of a sales organization to market it.

The Superior Tire Co., Anderson, Ind., recently organized with a capital of \$750,000, will erect a new plant with 50,000 square feet of floor space. The company will start on a manufacturing schedule of 300 tires daily, but when in full operation the plant will have a capacity of 500. O. Hibner, formerly sales manager of the Knight Tire and Rubber Co., is president of the company and Charles A. Be Saw, president of the Be Saw Tire and Rubber Co., is consulting engineer.

The Harroun Motor Corporation has moved its general offices from the Dodge Power building in Detroit to the Harroun plant at Wayne, Mich.

The Comet Automobile Co., Decatur, Ill., has let a contract for the erection of its new plant, which will cost \$87,752, exclusive of foundations or concrete floor. The first unit will be completed about March 1 and when in operation about 600 men will be employed.

The Lambert Multiplus Co., makers of the Troublepruf tire invented by H. M. Lambert, head of the company, will erect a factory at East Peoria, Ill., on a site of 40 acres.

The Ajax Forge Co., recently incorporated under the laws of Delaware with an authorized capital of \$1,750,000, is erecting a new forge plant at Superior, Wis., at a cost of \$200,000. The building is



New Alignment Hyatt Motor Bearings Sales Division: Centre, B. G. Koether, Manager; Left, H. A. Brown, Jr., Sales Manager; Right, R. E. Wells, Engineer.



The Sheltered Shipping and Receiving Platform Just Completed at the Works of the Continental Motors Corporation, Detroit, Mich.



Displays in Cork Insert Trade Campaign: Left, Pacific Coast Dealers' Window Trimmed with Transmission Lining and Fan Belts; Right, Advance Automobile Accessories Booth at the Ford Exposition.

120x200. Manufacturing operations at the plant will be started early in November. Headquarters of the company are in Chicago.

The Abbott Corporation and the Hal Motor Car Co. will combine and continue the manufacture of the cars they now manufacture, if the plan for merging the interests is favorably acted upon at a meeting of the directors to be held soon for that purpose. In addition to the Hal 12 and the Abbott six-passenger cars the company will also manufacture a truck.

The Essex Motor Co., Detroit, Mich., has leased the old No. 5 Studebaker plant on Franklin avenue, in that city. The building is 200x200, three stories in height, and has 60,000 square feet of floor space. The company was organized recently by prominent officials of the Hudson Motor Car Co. and will manufacture a light car to be known as the "Essex." The trade expects to receive an announcement of the specifications of the new car very shortly.

The Willys-Overland Co., it is reported, will soon announce another increase in prices in addition to the one made early in the present month, when prices were advanced from \$20 to \$35 a car. The new increase will be from \$50 to \$100.

George C. Morgan, who has been connected with the Toledo branch of the Willys-Overland Co., has become attached to the factory organization. He has been succeeded by John Yoke, who recently resigned as assistant sales manager of the Smith Motor Truck Co.

Frank W. Pilling, once assistant sales manager of the Krit and later district supervisor of the Liberty Motor Car Co. in the eastern territory, has been appointed district manager of the Hupp Motor Car Co. in Detroit and the middle west territory.

Frank R. Bacon, president of the Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has been given a commission as major in the United States Reserve (Industrial) and will supervise govern-

ment contracts for the manufacture of machine guns at New Haven, Conn. He formerly held a commission as captain.

The Harroun Motor Corporation, Detroit, Mich., has secured \$650,000 additional cash capital from interests in Kansas City. The money is to be used to increase the production to 25 cars daily, which schedule will be in effect within a month. The factory when in full operation will have a capacity of 80 cars a day, and production will be increased to that number as soon as possible.

The Blue Ribbon Body Co., Bridgeport, Conn., has opened a sales office in New York City at 1823 Broadway under the management of Charles Baasch, formerly of the Springfield Body Corporation.

A. T. Clark of the Anderson Electric Car Co. was elected president of the Kansas City Motor Car Dealers' Association at the annual meeting of the organization.

The Studebaker Corporation is rapidly improving its financial position. Since July 1, on which date the total bank loans stood at \$13,231,520, the floating

debt has been cut down to \$9,000,000. It is predicted that by the end of the year the loans outstanding will have been cut down to \$5,000,000.

The Clark Equipment Co., Buchanan, Mich., which succeeded the Celfor Tool Co. and the Buchanan Electric Steel Co., and now operates the combined plants, producing internal gear axles and cast steel wheels, has changed the names by which these products have been for a long time identified by the industry and the public, and in future "Celfor" axles and "Besco" steel wheels will be known as Clark. The wheel department is operating its new shop night and day to produce wheels for the Nash Motors Co., Packard Motor Car Co., United Motors Co. and other concerns.

The Advance Automobile Accessories Corp., Chicago, Ill., features cork insert linings in a widespread advertising campaign, being represented in the recent Ford Accessories show by a unique booth of its own and by other exhibitors in the same show, including the Warner Manufacturing Co.



Interior View of the New Wheel Shop of the Clark Equipment Co., Buchanan, Mich., Working Day and Night Shifts.

New Elgin Six All-Weather Car Disclosed

COMBINING the appointments and features of the most luxurious enclosed bodies, the new Elgin Six Sedan model, known as the "all-weather" type car, stands out prominently as a distinctive creation in its class. While its general specifications are identical with those of the Elgin five-passenger touring car and roadster models, the wheelbase is 117 inches and the front wheels are fitted with Timken bearings.

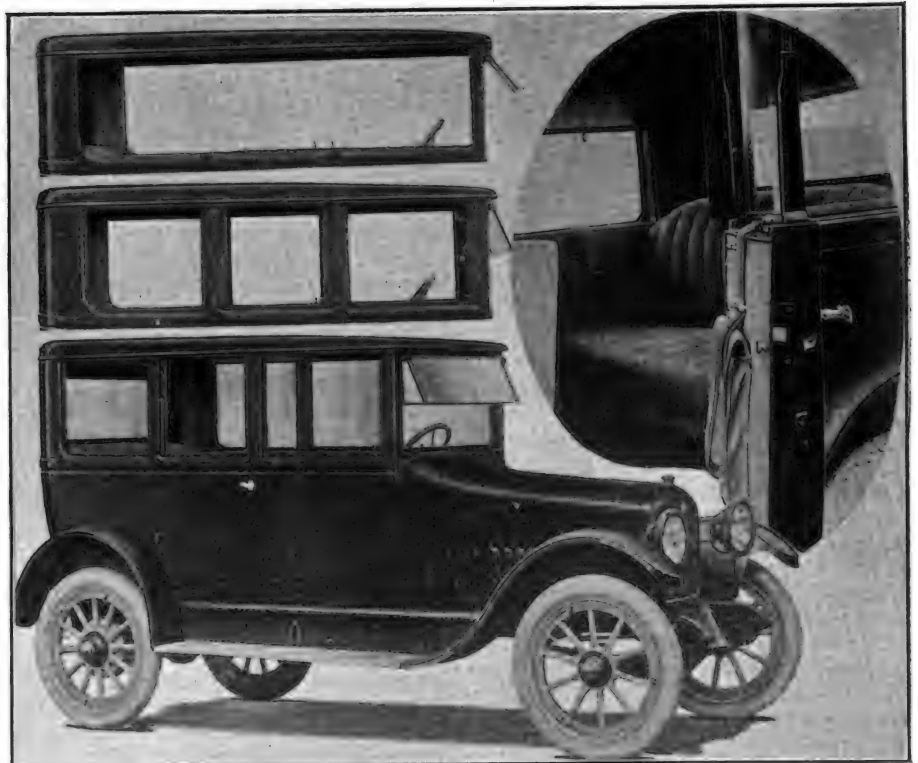
Great care has been given to detail in the construction, upholstery, interior finish and equipment of the body, which is fashioned after the latest Springfield type, having two doors, one on each side, and so attached that they can be entirely closed or entirely open to suit the seasons.

The best grade of Bedford cord is used in the interior upholstery as far up as the belt line, a lighter weight material being used above. The cushioning is made of the best grade of wire springs and filling material. The cushions are covered with a rich gray striped, durable whipcord in the pipe style, without buttons, and this same material is used to cover the back of the front seats and instrument board.

A convenient seating arrangement is provided through the use of bucket seats in front with a passageway between, leading to the tonneau. Ample room for the comfort of five passengers is afforded.

The same material as is used on the seats and door interiors covers the ceiling, which has an electric dome light in the centre. A heavy Brussel's carpet front and rear, neatly fitted and held in place by snap button fasteners covers the floor.

The convertible feature of the body is in the special arrangements and operation of the doors and windows, all of which are fitted with plate glass. The front quarter door and rear quarter win-



Elgin Six Sedan Model, Showing Also an Interior View and the Top with Windows and Frames Removed.

dows are set in frames and the front quarter and door windows drop and are provided with sash lifters. The rear quarter windows do not drop, but are removable and the rear window is stationary. Door windows are fitted with metal flappers and the construction of all windows is such as to eliminate rattle. The door pillars operate on hinges so that when the windows are dropped down the pillars close over the window compartments and are held in place by locks. When not in use the rear quarter windows can be stored in a compartment behind the rear seat. Each door has a liberal sized pocket in it.

A patented adjustable steering wheel, 18 inches in diameter, affords the driver extra room when getting to and from his seat, as it can be swung out of the regular driving position.

The ventilating type of windshield is made of plate glass set in a metal frame. The plate glass rain visor is set in metal sash and is of the adjustable type.

In addition to the usual standard equipment on Elgin cars, a heater comes installed in the Sedan. It is also fitted with a Stewart speedometer, charging indicator, dash lamp, electric motor driven horn, extra tire rim, set of tools, pump and tire repair outfit.

The stock finish is very striking, the body, hood, radiator, wheels and running gear being painted black with silver striping on body and wheels. The shipping weight of the Sedan is about 2800 pounds and it sells for \$1645 f. o. b. Chicago.

ELGIN SIX MAKES LONG TRIP WITH HOOD SEALED.

The Elgin Six, the national all trails scout car, in charge of Roy S. Marsh and a war reporter, which covered 6128 miles with hood, transmission and differential sealed during a trip from Chicago to San Francisco and return, arrived back in Chicago with all working parts in good shape despite the fact that the fan belt parted in the Mojave Desert and the remainder of the trip was made without the aid of fan cooling. President Charles M. Hayes of the Chicago Motor Club met the car upon its return and broke the seals he had placed upon the car when it left for the Pacific coast via the Lincoln Highway. The return trip was made over the National Old Trails road.

The scouts will return to St. Louis and continue their trip east through Washington and New York and back to Chicago before starting on a circuit of the Dixie Highway to Miami and return.



Elgin Six All Trails Scout Car, Dropping in on Chicago from its Trip to the Pacific Slope.

Dyke's Automobile Encyclopedia Issued

Sixth Edition Proves Notable Addition to Popular Hand Book and Well Indexed.

DYKE'S AUTOMOBILE AND GASOLINE ENGINE ENCYCLOPEDIA. By A. L. Dyke, E. E., St. Louis: A. L. Dyke, 1916. Sixth edition; 900 pages; illustrated. Price \$3.

THE sixth edition of this popular, practical book, treating on the principle, construction, operation, repairing, troubles and remedies, has appeared, much larger and better than any of the excellent editions which have preceded it. While not strictly a cyclopedia, the compilation of information on the subject is so comprehensive and exhaustive in detail that it constitutes one of the most complete reference works on automobiles thus far published.

In bringing out this new edition Mr. Dyke has packed into its 900 pages concise, valuable information for any one interested in any branch of motoring, made all the more valuable by his draft on his 21 years of experience in the automobile business as a supply man and publisher. From his first modest booklet, published in 1900, to the present issue, the intimate knowledge of his subject has been the mark of superiority in these books. The present issue is made the more valuable to any one who consults it by the fact that it contains 6000 lines of index, thus enabling the reader to find his topic readily. Any subject, trouble, remedy or repair, can be found in this index, and this detail alone deserves the thanks of the student or casual consultant. In addition, throughout the book gives its constant evidence of painstaking care in collation of material.

Its values as a text book are recognized in the fact that 58 of the leading automobile schools in the country use part of this book in their classes to teach the fundamental principles of assembly of a car, engine principles and construction, valve timing, ignition and carburetion points.

To the beginner this book furnishes opportunity to learn the fundamental principles of each and every part of an automobile from the engine to the axle. All cars are treated in a uniform way, leading the student to a mastery of the principles of the parts first, with explanations of the deviations of construction afterwards. Complete specifications of all cars are given so the reader will understand the variance of construction of the different makes of cars.

Before taking up the subject of repairing and adjusting, one learns the principle and construction of all the parts and then step by step is taken through the subject of adjusting and repairing. Other instructions cover such subjects as: How to build a repair shop for home or business; how to equip the shop from small tools to regrinding cylinders. Tire re-

pairs, welding, battery charging, etc., are thoroughly treated. One is then taught how to use tools; how to cut threads; to distinguish S. A. E. and U. S. S. threads; how to use and read measuring instruments; how to solder, case harden, repair radiators; how to redesign old cars; how to straighten frames, fenders, etc.

The instructions on ignition systems cover the entire field and in a simplified manner that anyone can understand. The instructions on the electric starting, generating and lighting is simplified with hundreds of clear illustrations of diagrams. There are 775 illustrations and 279 pages to the electric subjects in the book, including the storage battery and ignition subjects.

In addition to the book there are two supplements on the Ford and Packard, with 332 illustrations and 91 pages, part printed in two colors. There are also five colored inserts and a dictionary.

Supplement No. 1 deals with the Ford, of which there are 59 pages and 307 illustrations. Such subjects as how to get more miles per gallon; how to overhaul a Ford; how to make a Ford do 60 miles per hour; how to convert a Ford for commercial use; how to construct a combination body; how to construct a Ford racer; "fine-point" adjustment, etc., are dealt with in the Ford supplement.

Supplement No. 2 treats on the Packard twin-six, giving a complete detail description of this multi-cylindered car with many two-colored illustrations, its principle, and adjustments simplified.

The inserts illustrate the subject of different makes of engines, as the Continental, Franklin, Haynes, Sterling, Wisconsin aviation engine and many others.

A feature of the inserts is that of a four-cylinder engine, illustrated with blank space for the student to draw in the parts, in order to more clearly understand just where the various parts of an engine are located and the relation of one part to another. The address of the publisher is A. L. Dyke, Granite building, St. Louis, Mo.

Kelly-Springfield Co. Has Record Month's Sales

September Gross and Net Earnings Reported as the Largest in Company's History.

The Kelly-Springfield Tire Co. reports the largest gross and net earnings for the month of September in its history. It is expected that the company will be able to put away a surplus of at least \$1,500,000 this year after allowing for the usual dividend on the preferred stock and the regular \$4 dividend on the common.

The company has been nearly 50,000 tires behind orders at times this year, but this shortage in production will be more than met as soon as the big plant at Cumberland, Md., is finished, which will enable an increase of 400 per cent. in the output.

Standard Steering Co. Completes Big Plant

Cleveland Concern Announces Also a Specialized Organization Pushing 1918 Contracts.

The Standard Steering Wheel Co., Cleveland, O., announces that with the completion of its plant and an efficient organization the company is specializing in the manufacture of steering wheels for automobiles, airplanes, motor trucks, tractors and motor boats. The company is contracting for 1918 deliveries.

A special catalogue of the company's products is ready for distribution.

OXY-ACETYLENE WELDING TURNS WASTE INTO PROFIT.

"Turning Waste Into Profit" is the title of a new book just issued by the Prest-O-Lite Co., Inc., of Indianapolis, Ind. It is devoted exclusively to the possibilities of reclaiming broken and worn machinery and metal parts for service by the oxy-acetylene process, and is the most complete and comprehensive book ever issued on this subject. Containing 82 illustrations, it pictures and describes representative examples of reclamation welding work in practically every field of the industrial world.

In the face of present high prices and scarcity of metal equipment, the subject of welding is receiving more than usual consideration and this new book is truly a beacon to plant owners interested in the efficiency of holding down the "scrap heap." It is mailed to any interested executive upon request.

"SERVICE THE SUCCESSOR TO SELLING" HYATT.

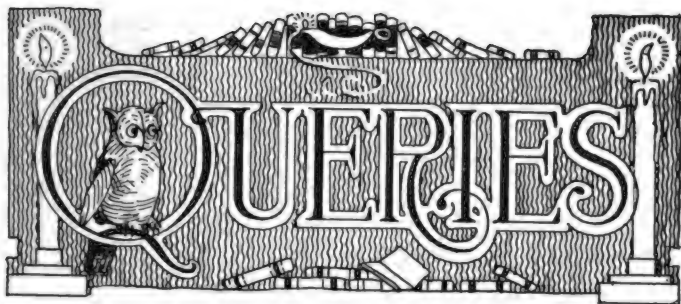
The Hyatt Roller Bearing Co., Detroit, Mich., has issued a neat little folder, entitled, "Service the Successor to Selling," explaining the company's policy of backing up its products with real service to manufacturers, dealers, salesmen and the general public.

"Such is our conception of service," says the writer, "the Hyatt company is glad to have it known that it freely renders such aid, and would be proud to demonstrate how thorough it is and how useful it might be to you."

LIST OF PRODUCTS OF THE DU PONT COMPANIES.

A neat little booklet, vest pocket size, has been issued, containing a list of the Du Pont products manufactured by the E. I. Du Pont de Nemours and associated companies, including the Du Pont Chemical Works, Du Pont Fabrikoid Co., the Arlington Co. and the Harrisons, Inc.

The booklet will be sent upon application to the home office at Wilmington, Del.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU LOCATE COMPRESSION LEAKS AND WHAT GASKETING METHODS DO YOU ADOPT ON THE INTAKE SYSTEM?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of November. The contest is open to every one.

HIS ENGINE STARTS HARD.

(F. F., Kutztown, Pa.)

I am having trouble starting my engine in the mornings when it is cold. After it is heated and during the day time it starts easily and runs well. Can you give me advice on this matter?

It would seem as though the trouble might be located in the carburetor or intake line, and we would suggest that you go over these parts systematically as outlined herewith.

For proper gas supply it is essential that the intake manifolds, as well as cylinder connections and valve bushings, are absolutely tight. Start the engine and let it run until it has warmed to operating temperature; do not let it race, but run it at normal speed in all tests.

Obtain an ordinary oil can (squirt can) and fill it with gasoline. With the engine running squirt a little gasoline around each of the spark plugs in succession. If bubbles are formed, or the engine speed is increased or decreased, it is an indication of leakage, which should be stopped. Before testing the next plug wipe off surplus gasoline. Test all of the plugs, all of the intake connections, around the valve stems and the joint between the carburetor and manifold in this way. Any change of engine action, either retardation or acceleration, is indication of leakage, which must be stopped. New gaskets at the intake manifold connections, new valve guide bushings, or new gaskets on the carburetor connection are the remedies used for leakage of this kind.

The next step is the valve adjustments. Adjust all of the valves or push rods so that the clearance between the valve stems and push rods is not over the thickness of a visiting card while the engine is warm.

Carburetor adjustment is the next thing to be considered.

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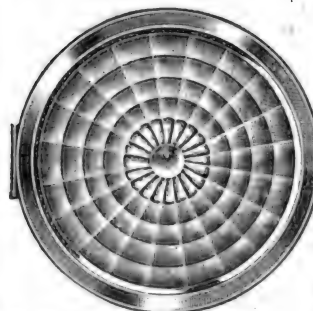
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TIMES BUILDING
PAWTUCKET, R. I.

This is taken up fully in the enclosed clipping, which we would advise you to read. After the carburetor has been cleaned the float level should be adjusted if necessary so that the height of the gasoline is just below the needle valve opening (about 1/16 inch). We would suggest that you have a garage man make this adjustment. Examine the carburetor linkage and control. Be sure that when the choker is closed the valve in the hot air pipe and needle valve are lifted.

Perhaps your trouble has been due to too rich a mixture; possibly you have held the choker closed too long. If the engine smokes badly when started this is probably your trouble.

The gasoline of today is not what it was a year ago and we are looking forward to a general epidemic of troubles such as you have, due to the low test gasoline, which does not vaporize in the cold weather and in a cold engine.

The next time you stop your car for the night, just as you shut off the spark, press down on the accelerator so that the engine will be primed for the start in the morning. A similar result may be obtained by pulling on the choker valve at the instant the spark is cut off.

Many Ford car drivers make a point of stopping their engine in the following manner: Extending through the radiator of a Ford car is a wire, which is connected with a butterfly in the air intake of the carburetor. With the engine throttled down to idling position this wire is pulled, cutting off the air supply and making an extremely rich mixture. After two or three explosions the engine will stop because of the excess gasoline. The engine will start easier next time without priming.

HARSHLY GRIPPING CLUTCH.

(M. C. W., York, Pa.)

The clutch on my Chevrolet 490 car, when being engaged, has a tendency to "grab," giving a jump, rather than starting gradually. Will you please give me advice as to adjusting it? How can I prevent the clutch from slipping? The water in the cooling system boils under ordinary conditions. Do you think this is due to carbon deposits? I have not had the carbon removed this summer.

The grabbing of the clutch may be due to extreme wear of the clutch facing, to unevenly adjusted expanders, or to extreme dryness. First, make an examination of the clutch facing, see if it is badly worn and has broken edges, which are apt to get between the flywheel and clutch drum.

If the facing is badly worn it should be replaced with a new one, which may be obtained from the Chevrolet service station. To remove the clutch facing and drum, first disconnect and remove the rear axle, transmission and clutch collar. Then revolve the flywheel until the hole passing through the clutch hub is exposed, and with a punch or drift, drive out the clutch spring retaining pin. The clutch drum will then be free, and may be taken from the flywheel. In replacing the clutch facing be careful to drive the rivet heads below the facing surface.

If the facing is not badly worn it may be cleaned with kerosene. After the facing has been cleaned free from grit and grease, rub a little neat's foot or castor oil into the leather to soften it.

After the leather has been cleaned and oiled should it still clutch harshly the leather expanders should be adjusted. Within the clutch drum you will note six projections, inside of which are springs, and on the top of which are nuts. These are called clutch expanders and are little plunger devices, which press upon the leather surface, raising it higher at the six points so that the engagement is gradual.

To adjust the expanders turn each of the expander nuts to the right until they lightly touch the clips, then give them a half turn to the left so as to allow proper expander action under the leather. If this does not remedy the trouble it may be that the expander springs are too weak. If this is the case the springs should be replaced with new ones from the factory.

If the clutch slips it is an indication that the clutch leather has filled with grease or is badly worn. The leather should be cleaned with kerosene and oiled with neat's foot or castor oil as directed above. A little Fuller's earth may be applied to the surface if necessary. If these remedies fail

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the clutch surface should be replaced with new.

There are a great number of causes for overheating, as listed herewith:

1. Carbon accumulations in explosion chamber.
2. Clogged muffler or exhaust line.
3. Clogged radiator or water jackets.
4. Over retarded spark.
5. Incorrectly timed valves.
6. Fan not working.
7. Racing of engine on low gear.
8. Lack of oil or incorrect grade of oil.

If the engine has recently developed the overheating symptoms, the 4th, 5th and 7th reasons may be ignored.

Carbon trouble has been more noticeable this season than ever before, due to the low test gasoline used. But little carbon deposit on the explosion chamber or piston heads will cause overheating. Examination will soon show whether or not carbon is present. The exhaust passages and muffler should also be examined and cleaned.

In certain localities the water contains impurities which are deposited in the radiating and cooling system. To clean the cooling system, dissolve half a pound of potash lye in five gallons of water and when the engine is heated draw off the water and put the lye solution (which should be strained through a cloth) in the system. Let the engine run for about two minutes, then allow the solution to remain for about five, then run the engine again until the liquid has again heated. The liquid should then be drawn off and the system flushed with cold, clean water, and the radiator refilled.

Proper radiation is often prevented by mud accumulations in the cells, or by caked enamel. Be sure that all mud and dirt is cleaned from the outside of the radiator.

Running with an over-retarded spark results in overheating. The spark should be kept advanced as far as possible after the engine has been started, but not so far as to cause a knock.

Be sure that the fan belt is tight enough to cause the fan to run properly. Do not run the engine in low gear for an extended period, nor race it while running idle. Be sure to

keep the lubricant at the proper level.

Inspect the valves and push rods. After the engine has heated inspect the clearance between the push rods and rocker arms. This clearance should be about .005 of an inch, or the thickness of letter paper.

The intake valve should begin to open when the piston has traveled 1/16 of an inch on the down stroke, and at this point the exhaust valve should be fully seated.

DELCO CUT OUT RELAY. (R. J. T., Chicago, Ill.)

There seems to be some trouble with the electrical installation on my Hudson car. With the engine running at normal speed the ammeter indicates charge (with no lights on). When the engine is stopped, however, very frequently the ammeter indicates a discharge and I have to disconnect the battery before the hand will come to zero. With the car running at average speed and all lights on, the hand indicates either zero or slight charge, depending on the car speed. I have made a careful examination of the wiring and cannot see that it is grounded or short circuited. I have tried disconnecting the wire from the generator and when this is done the ammeter indicates zero, so that it looks as though the trouble might be in the generator system.

Evidences would seem to indicate that the trouble may be located in the cut-out relay. This device consists of a set of contacts that are held open by spring tension and closed by an electro-magnet which overcomes the tension of the spring.

The electro-magnet has a compound winding consisting of many turns of very fine wire called a voltage coil, the terminals of which are connected across the generator line, and a few turns of very coarse wire, which is connected in series between the generator and the battery, through two points, which are held open by the spring when the generator is not running.

As the generator is started, generated current passes through the fine winding of the voltage coil and magnetizes

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the core. When the magnet gains sufficient strength the two contacts are drawn together and current passes from the generator to the storage battery.

As the generator speed decreases or ceases the current from the battery increasing above that of the generator flows back through the coarse current coil and neutralizes the magnetism set up by the voltage coil. The spring then opens the points and cuts out the battery from the line.

The current value at the time of the cutting in of the relay should be between $6\frac{1}{2}$ and $7\frac{1}{2}$ volts. In order to adjust the relay to cut in and out at the proper time, two things must be kept in mind. The tension on the spring and the air gap between the armature and core. The point of cut out is governed almost entirely by the spring tension, while the cut in is governed by both the spring tension and the air gap.

In making the adjustments a volt meter will be necessary in addition to the regular ammeter which is on the car. The platinum contact points should be examined and the surfaces smoothed over with an oil stone or fine emery cloth so that they contact all over.

The engine should be started and throttled to its lowest point and a voltage reading taken of the generated current, the contact points being held open by hand if necessary. The engine should be speeded up until the voltage generated is at least $6\frac{1}{2}$ volts, then the armature spring (on the cut out) tightened sufficiently so that the armature will be pulled away from the magnet at any voltage less than the $6\frac{1}{2}$, but attracted to the magnet at $6\frac{1}{2}$.

Now slow the engine down again, watching the ammeter. As the generator slows down the amperage begins to drop toward zero. At a point between zero and one ampere discharge (as near zero as possible) the points of the cut out should separate. If they do not separate until the discharge reads more than one ampere the spring tension should be increased. If it is necessary to increase the spring tension the cut in point must be adjusted again by decreasing the air gap between the magnet and armature.

BUICK D-45 SIX CAR ADJUSTMENTS.

(P. A. H., Buffalo, N. Y.)

Will you kindly tell me how to adjust the push rods and the carburetor on a Model D-45, 1916, six-cylinder Buick?

The push rods on this engine should be adjusted when the piston is at the top of the explosion stroke. Turn the engine over with the hand crank until the piston in No. 1 cylinder is at the top of the stroke and both valves are closed.

The distance between the valve stem and rocker arm should be .005, which is approximately the thickness of a sheet of heavy paper or thin visiting card. This adjustment is made by first loosening the lock nut on the end of the push rod directly beneath the rocker arm adjusting nut. The rocker arm adjusting ball nut should then be turned until the proper clearance is had between the rocker arm and valve stem, then the lock nut tightened. With the valves closed there should be a slight amount of play in the rocker arms.

The carburetor is adjusted as follows: Turn the gasoline adjustment to the right until the needle valve is completely closed, then open it one full turn. Set the air adjusting screw so that the head of the screw is even with the point of the ratchet spring just above it. Then start the engine and allow it to run with the air regulator turned to "Hot" until the engine is thoroughly warmed.

With the spark lever fully retarded turn the gasoline adjustment to the right, closing the needle valve until the engine idles smoothly. Advance the spark lever and turn the air adjustment to the left, a little at a time, until the engine begins to slow down or skip, indicating too much air; then turn it to the right until the engine runs smoothly.

To test the adjustment, leave the spark lever advanced and open the throttle two or three notches quickly. The engine should accelerate instantly. If it skips or pops back open gasoline adjustment slightly by turning needle valve to the left. Do not touch air adjustment again unless absolutely necessary. The best possible adjustment is had when gasoline adjustment is turned as far as possible to the right

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and air adjustment is turned as far as possible to the left, letting engine idle smoothly and accelerate quickly when throttle is opened.

FITTING PISTON RINGS. (R. M., Cambridge, Mass.)

When piston rings come from the factory are they all right and fitted so that they will fit the cylinders? Someone tells me that the rings should be lapped or ground into place and fitted on the ends. Is this so? How are they fitted and ground?

Very few piston rings, as they come from the factory, are fitted so as to give their full efficiency, and in many cases, if they are not fitted to the particular engine in which they are to go, they will give very unsatisfactory results.

The first step in fitting rings is to see that the piston ring grooves are clean and do not have a deposit of carbon in the corners. When rings are fitted they should be adapted to the place where they are to go and it is essential that they be placed in the same location to which they were fitted.

After the piston ring grooves have been thoroughly cleaned the ring should be "rolled" around the groove. In this way the width of the ring and width of the groove can be compared. Should the ring bind at any point it should be cut down with emery cloth. For this purpose tack a piece of emery cloth on a flat board and carefully rub the ring back and forth across it until the required thickness is had. The ring should fit the slot with a very slight amount of play or it will bind when it is heated.

The next step is the cutting of the ends to fit the cylinders. Slip the piston ring into the cylinder about two or three inches with the bottom of the ring parallel with the bottom of the cylinder. The ends should be against each other. As a general rule the ring is left long when furnished by the factory, to make up for cylinder wear. The ring slot must be filed until the ends are flush with each other, with no clearance and the sides parallel.

The ring may then be put on to the piston or upon a pine block of wood, preferably the latter, which is fitted with a groove and clamping device for holding the ring solidly. The inside of the cylinder is then coated with Prussian blue, and the ring slipped into it. Upon the withdrawal of the ring the high spots will be coated with the blue. A very fine file or emery cloth may be used for removing the high spots, the blue wiped off and the process repeated, until an even coating on the ring indicates contact at all points with the cylinder.

After the ring has been fitted to the cylinder it should be taken from the piston or wood block and again slipped into the cylinder. The ends of the ring should then be examined and given a certain amount of clearance or the ring will jam in the cylinder when it is heated. The clearance between the ends of the ring should be between .004 and .006, depending upon the size piston.

The ring should then be put in place on the piston and given a good coating of oil. After all of the rings have been fitted in this manner they, as well as the cylinders and pistons, should be well oiled before being assembled. If this is not done the cylinders may be scraped, since there is an interval between the starting of the engine and the time when the oiling system becomes operative.

HUDSON STARTING SYSTEM. (H. B., Detroit, Mich.)

When I pull out the ignition button on my Hudson Six car I notice a buzzing sound, which seems to come from the motor starter. Is the ignition connected with the starter and how does it effect it?

To understand more fully the action of the Delco system, let us explain the construction of the motor generator. This unit consists of an armature, which is connected on one end (rear) with a train of gears that are only meshed with the flywheel when the starting switch lever is held in the extreme forward position. The armature is fitted with two commutators and two sets of brushes; those on the front end rest against the commutator at all times, while those on the

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Write for a free booklet, "Lubrication of the Motor Car."

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rear press against the commutator when the starting switch
is down.

At the front of the armature shaft is a clutch arrange-
ment, which connects the armature shaft with the pump shaft,
but allows the armature to run faster than the pump shaft
when the unit is acting as a motor, for starting the engine.

With the engine at rest the train of starting gears are not
meshed with the flywheel, neither are the brushes of the mo-
tor end against the commutator. When the ignition switch is
pulled out current passes from the battery through the arma-
ture (generator end) and causes the armature to revolve
slowly. If this were not done the gears might not mesh
properly when they were brought against the flywheel.

The starting switch lever is then pressed forward. At
the beginning of the movement the train of starting gears are
meshed, then the generator circuit is broken, and finally at
the extreme forward position of the starting switch both mo-
tor brushes are brought into contact with the commutator
drawing the current from the storage battery and causing
the armature to revolve as a motor.

As soon as the starting switch is released the brushes on
the motor commutator spring away from contact and the
gears unmesh. The generator circuit is again completed
and the water pump shaft drives the armature.

OVERHAULING THE CADILLAC.

(Continued from Page 16.)

the clutch discs. The nuts on the end of the studs of the
front plate retainer may then be removed and the nut on the
big bolt backed off.

The ball release bearing is retained on the clutch spider
by a spring split ring, which may be pried off with a screw
driver if necessary. In assembling the clutch it is a good
plan to put the discs in place inside the large driving flange,
leaving them there until the large bolt has been loosened and
the clutch plates locked together by the spring pressure.

Work on Transmission Members.

After the control rods have been disconnected the trans-
mission cover upon which is mounted the gear change lever
may be taken off. The six bolts which fasten the universal
joint to the transmission shaft are next taken out, releasing
the transmission, which may then be removed from the car.

If the car is of the later models the tire pump should be
removed at this point. The two ball bearing races upon
which the transmission main shaft is mounted are retained
by caps, which are fastened by cap screws. These caps
should be removed and the outer ball races driven out of the
housing from the inside. With the bearings removed the
main and clutch shaft with gear attached may be taken from
the gearset.

The countershaft is held in place by a cap on each end,
directly beneath the main shaft, and when removed the gears,
together with the roller bearings, may be taken from the
housing.

The rear axle, together with the differential and drive
shaft, may be removed, without disturbing the housing or
wheels. First remove the wheel hubs exposing the axles
which drive through spiders and may be drawn from the car.

The flange which attaches the drive shaft housing to the
rear axle housing should next be removed, bringing with it
the drive shaft, universal joints and differential assembly.

After the rear universal joint has been disassembled and
the nut removed from the pinion gear shaft, the universal
joint flange may be pulled from the pinion shaft. The front
roller bearing is fastened into place by a cover plate, which
may be removed and the bearing taken out for examination.

Examining Differential Assembly.

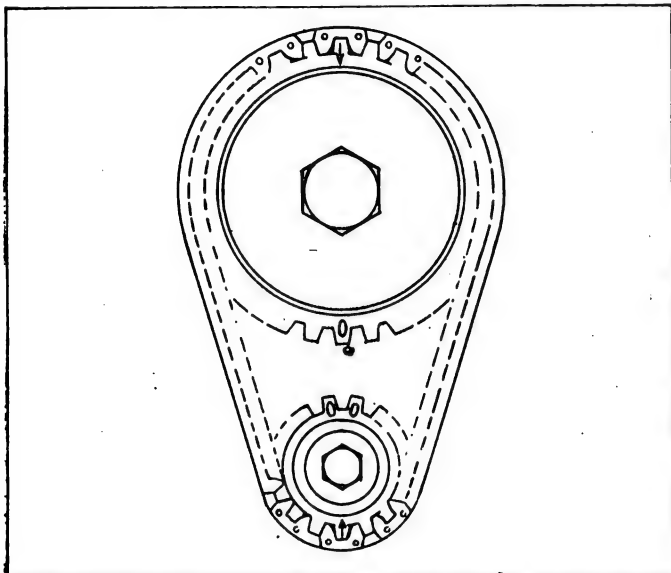
The pinion gear is made integral with the shaft and re-
moved from the rear after the differential assembly has been
taken out. The differential assembly is mounted upon two
bearings, one on each side, which are fitted with adjusting
nuts. Remove the two caps which are bolted to the housing,
releasing the bearings and adjusting housings together with
the differential. This applies to models 55 and 57. The outer
races of the roller bearings are adjustable by two sleeves,
which are threaded into the housing, the sleeve on the front

bearing turning out toward the front, and the rear sleeve toward the inside or rear.

On models 51 and 53 the front bearing is very similar and is fitted with a threaded adjustment, which is mounted inside a housing upon which is fitted the roller bearing for the front of the pinion gear shaft. This whole assembly of two bearing adjustments is mounted in the big housing and fitted with a threaded adjustment by which the relation between the pinion and master gears may be altered. In disassembling this type of axle the outside adjustment is taken off first, then the others in turn toward the inside.

An adjusting collar upon each side of the differential assembly permits the adjustment of this unit. In making the adjustment between the master and pinion gears a good plan is to attach a crank (of wood or iron) to the pinion gear shaft so that the pinion may be turned rapidly by hand. The various adjustments should be made so that the two gears are meshed deep enough to prevent all but a little play. When properly adjusted the backs of the gears should be flush with each other. The crank may then be turned by hand and the adjustments made until the gears do not bind at any point.

When the gears bear the proper relation to each other the two adjustments on the differential should be brought near enough together to prevent side play. The same should be done with the front bearing which carries the pinion gear shaft. When making roller bearing adjustments the rolls should not be clamped too tightly and there should always



Cadillac Timing Sprockets and Chain. Showing Correct Setting Position for Sprockets and Position of Marks on Teeth.

be a very slight amount of play in the bearing or it will wear extremely fast.

The above statement relative to adjusting roller bearings applies to the wheel bearings as well as those in the differential. Both the rear wheels are held in place by two large nuts with a lock washer between. When the car is jacked up the nuts may be removed from the housing, then the lock washers, then the adjusting nut. When the nuts and lock washers are put back into place, if the lock washer cannot be fitted with the inside nut as originally adjusted, it is best to unloosen the nut rather than to tighten it. The front wheels are mounted in practically the same way, and what is true of the rear wheel bearing adjustments is true of the front.

Adjustments.

The carburetors on all of the models are practically the same and have but one adjustment for running, that being the air valve screw. With the engine running and the manifold heated the air valve screw should be so adjusted as to give the best results at throttled down and normal speeds. If the carburetor has been disassembled for cleaning the float should be adjusted so that the distance between the carburetor body and the top of the float is $\frac{3}{8}$ of an inch on type 51 and $\frac{1}{2}$ inch on types 53, 55 and 57. This measurement may be taken with the carburetor upside down and the float chamber removed. The float arm may be bent so that the float is

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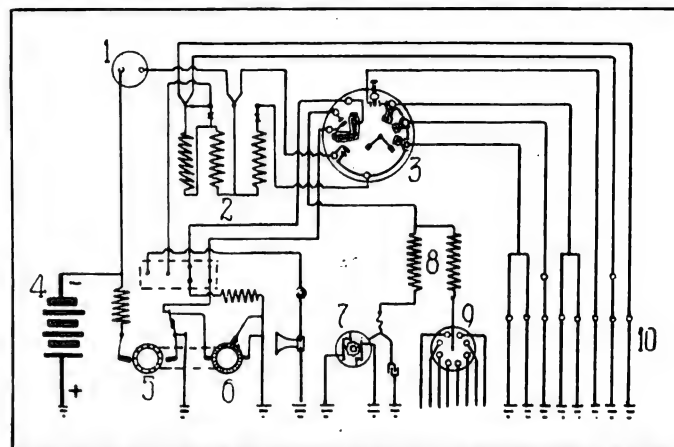
the proper distance from the body. The plunger device, which is actuated by the throttle lever, is designed to force gasoline through the needle valve upon quick acceleration and the top of the rod should be flush with the arm.

At high engine speeds on the later carburetors a cover is attached to the throttle lever, which covers or uncovers a slot in the throttle body, through which is admitted extra air. This cover should begin to uncover the slot at approximately a half open throttle position.

Before setting the valve clearance (distance between valve stem and tappet) the valve which is being adjusted must be brought into a certain position. Turn the engine over with the hand crank until the valve which is being adjusted has just seated and the tappet has dropped away from the valve stem. The valve clearance should be from .002 to .003 when the engine is cold.

Both the camshaft driving sprockets are marked and should be replaced as follows: One tooth of the camshaft driven sprocket is marked with an arrow and the tooth diametrically opposite with an O. A tooth on the crankshaft sprocket has a similar arrow upon it and the two teeth opposite each have an O mark.

Turn the camshaft and crankshaft to bring the sprockets with the arrows pointing toward each other as illustrated, and with the O mark on the camshaft sprocket opposite a point between the O marks on the crankshaft sprocket. Then put on the chain. In replacing the camshaft chain, as well as the fan drive chain, care must be used to see that the chain



Cadillac Wiring Diagram: 1, Ammeter; 2, Circuit Breakers; 3, Combination Switch; 4, Battery; 5, Motor; 6, Generator; 7, Timer Contacts; 8, Ignition Coil; 9, Distributor; 10, Lighting Lines.

is so placed on the sprockets that the arrows, which are stamped on the outside links, point in the direction in which the chain is to run.

Before timing the ignition the breaker contacts in the distributor head should be set properly. Remove the distributor head and the distributor arm and turn the engine over with the hand crank until the breaker arms rest on top of the lobes of the cam. The platinum contact points, which should be smooth and clean, should be adjusted .020 of an inch apart.

The spark lever should then be moved to the extreme left on the sector and the piston in No. 1 cylinder brought to the top of the firing stroke. (No. 1 cylinder is the one nearest the radiator in the left hand block of cylinders). The lock screw, which is located at the centre of the cam, should then be loosened and the cam turned by hand until the distributor brush in the rotor is directly beneath the secondary terminal marked No. 1 and the breaker points just separating. The lock screws should then be tightened and the timing checked. The timing may be checked by marks on the flywheel. If the spark is set at full advance the mark IG/A on the flywheel will be directly beneath the pointer when the spark occurs in the plug.

The firing order of the Cadillac engine is 5, 2, 7, 1, 8, 3, 6, 4. No. 1 cylinder is the one nearest the radiator in the left block of cylinders and No. 5 is nearest the radiator in the right block of cylinders. This is the order in which the secondary wires should be connected with the distributor cap.

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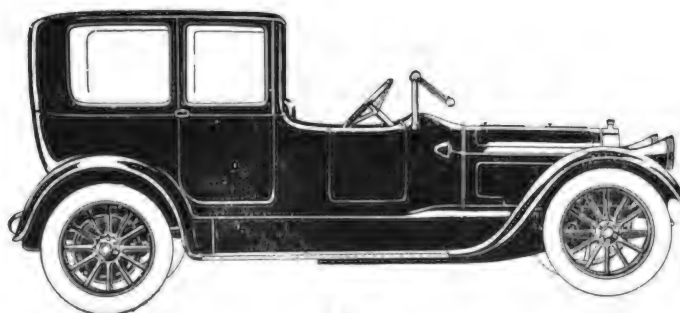
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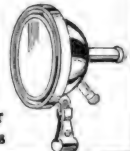
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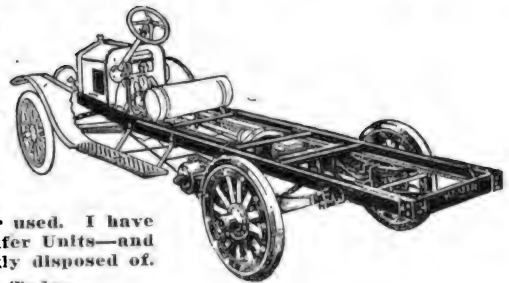
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Treasurer . . WILLIAM H. BLACK
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Times Building, Pawtucket, R. I.

ANTICIPATION is a rather long word, and so is preparedness. There is an old saying, too, that an ounce of prevention is worth a pound of cure. These long words and the old saw, however, point a timely moral to all motordom. It seems to be wisdom and forehanded to look ahead a little by looking squarely at what is going on in the motor car industry, the trade and motoring. War demands are making inroads on the stocks of materials and some curtailment of production is to be expected. It is fortunate for the industry and fortunate for the public that big men are taking hold of the war industries and war materials for a sane, yet patriotic adjustment of the supply of steel and metals. The automobile industry has risen to every demand on its resources, even to the point of yielding great factories to the government entirely, if necessary. Happily, the commandeering of supplies has been stayed for the time at least, and with prospects of a compromise for the entire period of the war. However, the spirit of preparedness would dictate that no motorist should let an opportunity go by to keep his car and equipment neat, strong and in good order. Men of affairs must have their cars. New cars will be bought and sold. More attention must be given to the salvaging of used cars and materials, and more intensive use made of cars and motor vehicles. Such efforts will help win the war, and they will be a distinct gain also to the individuals and firms who follow such a course.

THE National Automobile Association calls the attention of members to the wisdom of reporting to the association counsel in every case of accident, as outlined in the section of this journal devoted to the news of this association.

AS WINTER draws near the motorist finds it necessary to select equipment and accessories that will give himself and the occupants of his car the best of comforts when riding in the cold. There is stock to be secured for the garage, as well as heaters, robes and other paraphernalia for the car. Careful choosing needs to be exercised in order to get the most for the outlay, as well as superior quality and exceptional efficiency. In the next issue of the Automobile Journal the annual review of winter heaters and equipment will be presented. This is an exceptional guide for the selection of just the right thing, as many satisfied readers have frequently attested of this feature for several years past.

THE garage design prepared by the architectural department of the Automobile Journal Publishing Co., for publication in the Nov. 25th issue, will be a two-story structure, with plans for a chauffeur's room on the second floor. The structure is artistic, roomy and well laid out for housing two cars. This two-story garage is a fitting addition to the series of garage designs regularly appearing in this journal, and of especial interest to those who build for permanence and adornment of their grounds.

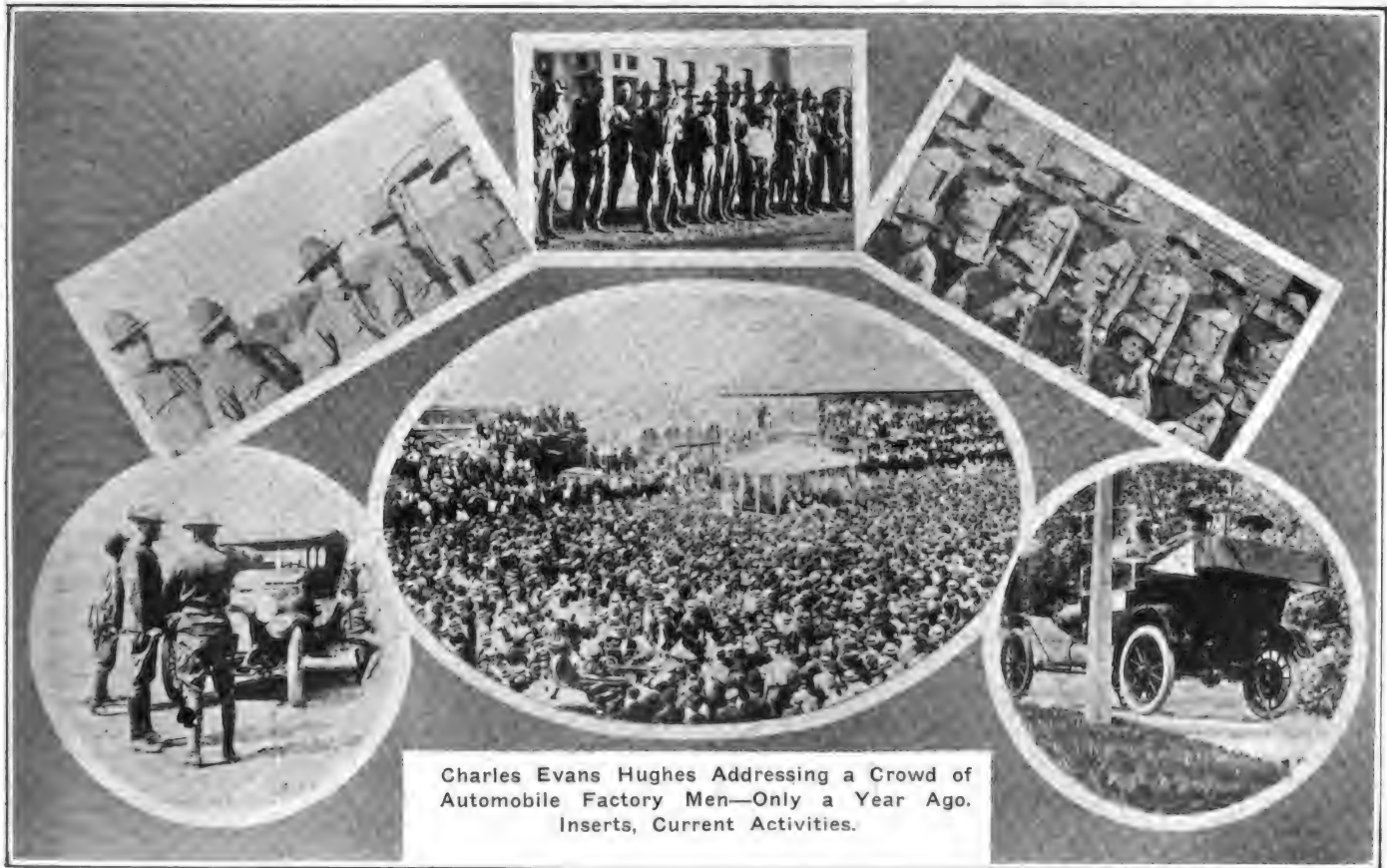
WITH all that is going on preparations for the great national automobile shows should not be lost to view. The Automobile Journal shows numbers this year will be filled with accurate, reliable data on the new cars, will tell who will be producing cars, parts, fittings, and where to get them, in addition to a vast fund of information on the new motor and body designs, constructional features and accessories. The first of these, the New York advance show number, will be mailed Dec. 25th.

THE Automobile Journal

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So the Country Went To War And USED CARS Boomed When Curtailment Days Came

AS A RESULT of the recent conference of large manufacturers in the industry with the War Industries Board at Washington, there has been a much stronger tone in the used car market, reflecting the developments of the meeting which it is believed will ultimately mean a substantial reduction in the output of new cars at least for the period of the war. While nothing was given out following the conference of a definite nature, it is understood that a plan will be worked out by which some of the manufacturers of cars and parts will devote at least part, if not all, their manufacturing facilities to war work instead of their regular production. It is the intention of the board to restrict the

production of "non essentials" wherever it will help in increasing the output of war materials.

Shortage of Chrome Steel.

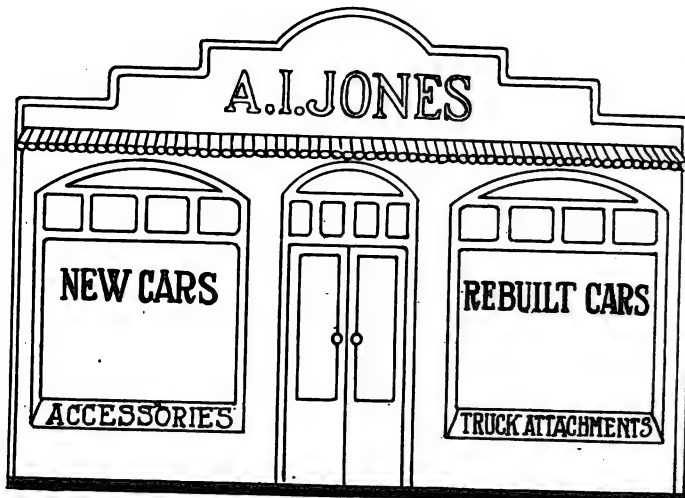
Last spring, when the shortage of chrome first made itself felt, the motor car industry in this country began to re-

flect the scarcity by curtailment and declines in the market prices of motor stocks.

While it is idle to speculate on the results of this action at this time, as no one knows how extensive the curtailment will be, it is safe to assume it will be of proportions sufficiently great to affect the used car markets through causing a scarcity of new cars. Results of similar action in England affords a good basis for anticipating the effect. Immediately after the English passenger car manufacturers were required to curtail production, used car prices climbed steadily and continued upwards. Some idea of what used car values are in England is gained from want advertise-



Then Sammy Takes His Gun and Goes Out to Can the Hun.



The Progressive Dealer Expands His Business in Accordance with the Times and Their Demands

ments in the English magazines, all of which quote prices that are more than the cars originally sold for. The following instances are found in one of the recent issues: Ford, 1914, \$400; Hupmobile, 1915, \$1125; Overland, 1914, \$650; Studebaker, 1916, \$1250; Buick, 1915, six-cylinder model, \$1650.

Precedents in Great Britain.

These prices, which would seem ridiculous in this country, are not nearly as startling as those asked for some of the high grade English cars, which are no longer manufactured. In Paris an advertisement was put in one of the newspapers offering a Rolls-Royce car for \$17,500, which is several times its original cost. This make, the Renault, Panhard-Levassor and Delaunay-Belleville and other English and French makes, which correspond to the Packard, Pierce-Arrow, Locomobile, Marmon and other high grade cars made in this country, cannot be purchased unless one pays from two to three times their original cost. Cases where \$18,000 and \$27,000 have been paid for cars are on record, and one make of French cars of only 20 horsepower sells for \$7500 in the used car market.

These prices seem unusual, as the operation of automobiles in England is restricted to those who are acting in government capacities, and a motorist must use kerosene, coal gas or some fuel other than gasoline if he wishes to tour or use his car as much as he likes. Since the prohibition of gasoline use other than for government purposes, hundreds of owners and operators of public buses

have turned to coal gas for fuel, and it has proved practical and far cheaper than gasoline at the prices now charged in England.

Of course it could not be expected that this country would experience similar effects of curtailment in the motor car industry, but it would be appreciable so far as used car values are concerned, as motorists would be obliged to run their cars until they had used up all their service value instead of trading them in at the end of one or two years. Their only alternative would be to pay an ex-

ordinate demand for commercial vehicles has resulted in a great activity among the truck makers and has attracted many new manufacturers to the commercial car field, but with the enormous government demand for trucks it is generally admitted that even with the increased production there will be an actual shortage in the spring. Never before in the country's history has there been such an urgent need of transportation means for short, as well as long haulage work, with the result that truck attachment agents who sell the job completed are obliged to get used cars in place of new ones owing to a lack of supply.

A business man under the new conditions existing in the trade must dispense with old, loose methods of handling merchandise and adopt the most efficient and up-to-date means to meet competition. The recognition of this situation has greatly stimulated the demand for used cars to be converted into commercial purposes, but there are other factors in the outlook

which will wield considerable influence. While there has been a noticeable diminution in the sale of medium priced cars, the makers of this type of car have on the whole curtailed production to some extent.

The strongest factor in the used car situation, however, is the rapid development of the dealer specializing in used cars. In the large cities a great many of



From—

orbitant price for a new car. Some car manufacturers have already curtailed their production 40 per cent. for the coming season, while many of the big car producers will be obliged to curtail extensively through lack of steel supplies. Such a condition in the face of the fact that the demand absorbed the enormous production of last year points plainly to an even higher level of prices on new cars than at present and a resulting higher valuation on all used cars.

The more rigid business economy and greater business efficiency that has grown out of the war is making itself felt in the motor car industry and will undoubtedly have a very beneficial effect upon the used car market. The in-

dealer specializing in used cars. In the large cities a great many of



Of Automobiles—



And the Land Was Full—

these dealers have sprung up and applied business principles to the question with the result that prices are held up, as these dealers take practically all the surplus cars on the market and hold them for their price, which represents the actual service value in the cars more than an arbitrary value. Just what the status of the used car would be had not these dealers sprung up is hard to state, although it is pretty certain that values would be ridiculously low and a very injurious effect would have been felt in the



One End—

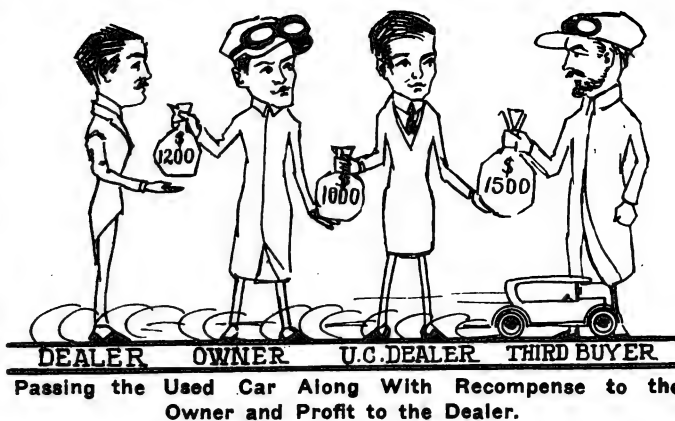
new car business. The extent to which these used car dealers have figured in the situation is found in one single instance in Boston, where one dealer carries from 300 to 400 used cars and has upwards of \$140,000 invested in his business. This dealer takes thousands of used cars a year and places them in the hands of permanent users who pay fair prices. His business is largely instrumental in preventing the used car from becoming a drug on the market and the establishment of similar enterprises in that and other cities is having the same effect.

If the "point of saturation," which is the theoretical condition existing when everyone who could afford an automobile had one, was being approached, the outlook would contain many elements of uncertainty, but according to experts an oversold condition will never obtain for many years, if ever, as a large per cent. of the 4,000,000 machines now in use are owned in cities and towns and it is conservatively estimated that there is fully 5,000,000 owners and possible prospects in that sales field, while there are over 7,000,000 farmers in the country, half of which number can be safely counted on as motor car prospects. This latter field of distribution is looked upon as a most promising one from the used car dealers' viewpoint, as farmers are inclined to buy a used car when making their initial venture into motordom and their appeal is specially attractive, as, in addition to the low first cost he can use them with a truck forming attachment that is readily interchangeable, giving him both a business as well as passenger vehicle.

Much progress has already been made by dealers in their used car investigations, analyses and transactions. The trade has fairly begun to see that exchanges and rebuilding, instead of being hindrances, are really great developers.

Probably no better sign of the dealer's change of heart as regards the used car problem is his shift of attitude toward handling them. Probably for the first

time on record an advertisement recently appeared in an eastern city soliciting the attention and business of owners with old cars to trade in. In fact, the dealer who inserted this advertisement called it a "trade-in-sale," and states that "the best authorities agree that new cars will be hard to get at any price."



Adjustment Plans in Strong Hands

FOLLOWING a conference of the passenger car manufacturers represented by the directors of the National Automobile Chamber of Commerce and the directors of the Motor and Accessory Manufacturers held with the War Industries Board, the order prohibiting shipments of alloy steel for car manufacture was stayed and it was decided to appoint

representing the Ford Motor Co. This committee will work out and supervise a plan for the gradual shifting of the great automotive industry machinery where necessary into munitions manufacture so that the government will obtain all the supplies necessary without unduly crippling the car manufacturers.

Through this arrangement the output of cars will be cut down to some extent, but the change will be gradual and the industry will so adjust itself that it will not feel the effects as it would have under a plan to suddenly check the production of passenger cars.

A great amount of assurance is taken in the industry from this well directed turn of affairs. For several days there was confusion and the trend seemed to be toward a wholesale curtailment of motor car manufacture, with its inevitable depressing effects on accessories, supplies and other allied lines. Howard Coffin de-

flected this fearsome trend at a critical time by pointing out that a great economic mistake would be made if the proposal to commandeer 40 per cent. or more of the automobile plant capacity were carried out, when, the first week in November the steel and freight embargoes were put in effect.

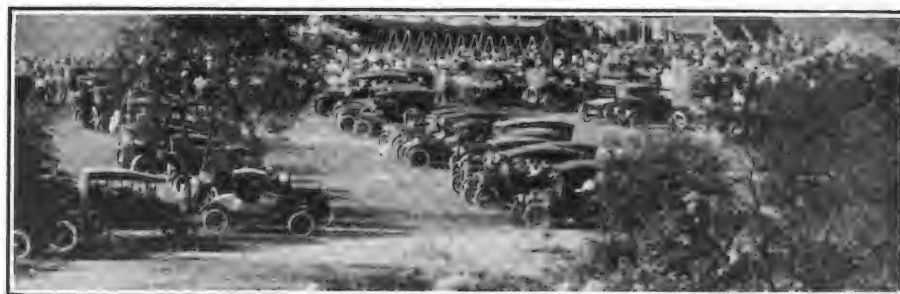
When the situation seemed most critical Henry Ford was willing to forego car manufacture in order to let all the steel be turned to the uses of the government, and devote the services of his great plant to producing war materials.



To—

a committee representing the industry that would assume control of such matters and handle the adjustment of the situation, unless conditions became so acute that the government would need all the alloy steel.

Howard Coffin of the Aircraft Production Board and Col. Charles E. Clifton, president of the N. A. C. C., both spoke in behalf of the industry and urged the appointment of the committee, which is composed of Hugh Chalmers, representing the N. A. C. C.; A. W. Copeland of the M. and A. M., and John R. Lee, rep-



The Other. Yet With Cash A-Plenty for More.

ANNOUNCING TRADE OUTLET

**Automobile Journal, Motor Truck, Accessory and
Garage Journal, New Special Feature for Manufacturer,
Dealer, Motorist and All Classes of Allied Service.**

THE Trade Outlet, a new service feature, now announced by the Automobile Journal Publishing Co., incorporates in the advertising pages of three magazines, the Automobile Journal, the Motor Truck and the Accessory and Garage Journal, a distinct class of helps for all the readers of these journals, motorists, manufacturers, dealers or the thousands of workers in varied capacities in the trade and industry. Every reader is a buyer of some of the materials or service which are advertised in these columns.

The motorist may be looking for parts, equipment, make or model of car or accessories; the dealer is looking for used car parts; the manufacturer for materials and services, including individual services in all sorts of employed capacities—to mention most briefly the merest few of the thousand and one ends to be served.

The Trade Outlet is unquestionably the most unique, effective and economical market place in the world for everything connected with the automobile and automobile industry. It reaches 75,500 buyers, grouped in classes who are constant, shrewd and consistent purchasers of the materials and services that they need. Their needs never end and they are the one class of people on this great, busy earth who have constant communication with the horn of plenty. They know the value of a nimble dollar and have done more to keep money in active circulation in the past few years than any other class.

The readers of these magazines buy from one another and sell to one another. They have opportunity in the Trade Outlet to make their own bargains known and watch out for the other fellow's bargain offer.

The Trade Outlet reaches out its services to 25,000 garages, factories, service stations, repair shops, machine shops, accessory dealers and traders in the Accessory and Garage Journal. The Trade Outlet goes before 6000 truck owners and users, 1500 truck dealers and service stations in Motor Truck. The Trade Outlet goes to 35,000 owners of passenger cars in the Automobile Journal and 8000 car dealers, service stations, garages and repair shops in the Automobile Journal.

It is the superlative market place for anything that has value for new cars, used cars, parts, fittings, equipment, machinery, tools, accessories, supplies, and at extremely moderate rates.

Mutual interest directs attention to the Trade Outlet announcements. Long ago the advancements of modern advertising inculcated the lesson to never lay down the book without carefully scanning the advertisements. To motorists and all connected with the industry the materials and services offered from the first page to the last possess the keenest attractiveness and value. With their wide range of subjects, the Trade Outlet presents all the value of a classified section. A most pleasing variety is presented and the end of many a long and weary search for that one particular part, fitting, service or piece of equipment is resting in the announcements of the Trade Outlet.

Finally, reader, don't lay this copy down without consulting the Trade Outlet.

For rates and full information write today.

AUTOMOBILE JOURNAL PUBLISHING COMPANY,
Times Building, Pawtucket, R. I.

Training Technical Men in Great Automobile Shops

Packard Opens Service School to Give Factory and Field a Greater Supply of Experts in the Mechanics of Cars and Trucks

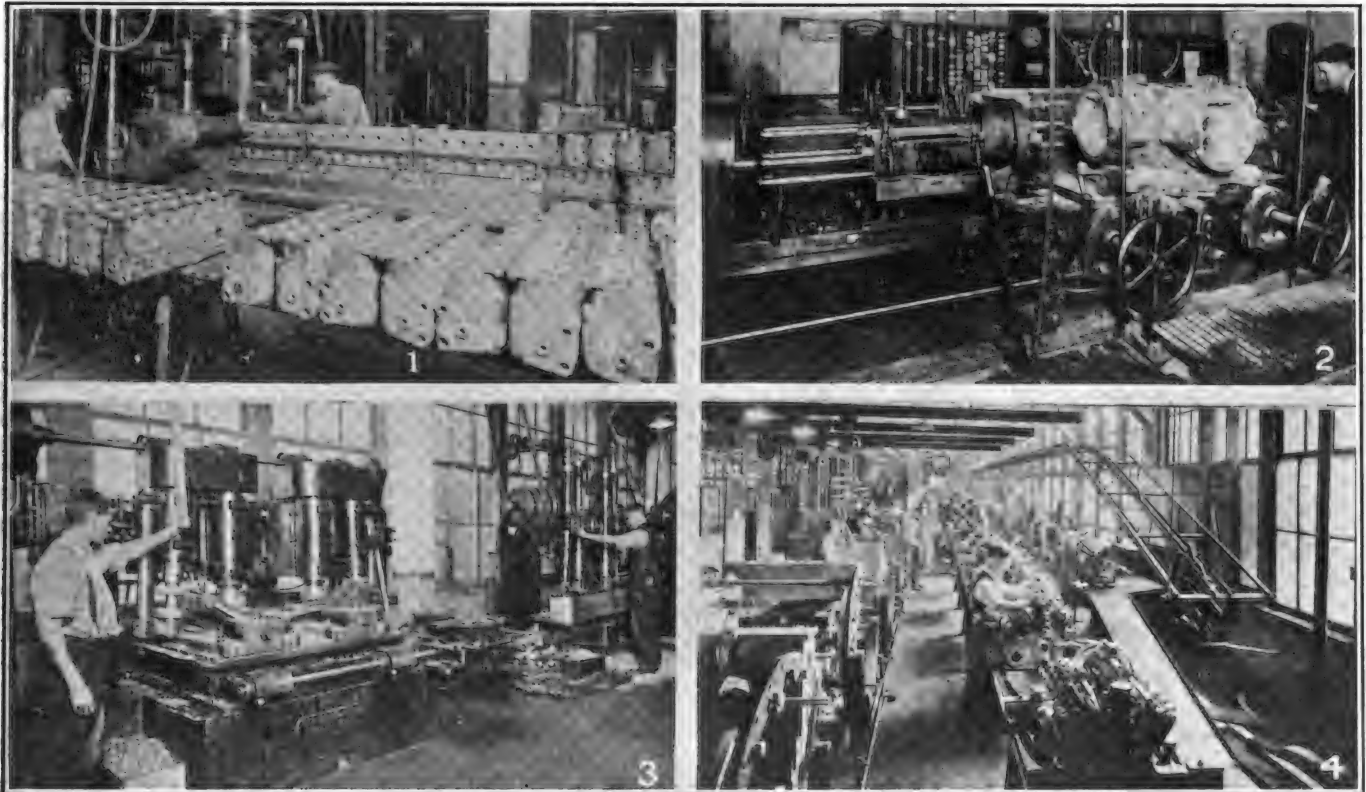
PRODUCTION in an automobile factory is well known in the industry to depend upon the mechanical knowledge of its workers in conjunction with the machine efficiency of the plant. While a maximum effectiveness of coordinated man power and machine power has been developed in many of the shops of America's foremost manufacturers of motor cars, it is also recognized that the factory need for mechanics and men of technical knowledge grew faster than the supply even before the war began its draft on the industry. Furthermore, closely coupled with the makers' interest in the ability of their workers from a

Some inkling of the factory demand for mechanics came to light several years ago, when "five dollars a day" was first posted for a wage in the automobile shops, and the fact was flashed on moving picture screens all over the country, where men who could not read or speak the language, nevertheless realized the import of the pictures presented to their eyes and how to grasp its golden opportunity. This was proven in the city of Lawrence, where an audience of 200 men sat passive throughout a picture show provided for new Americans, comedy, western drama and all. But there was wild uproar when the picture of a De-

closes under impetus of war's demands for general utility vehicles of all sorts.

In this situation the motor car industry finds barely enough skilled men prepared each year for vehicles under construction. The skilled men who care for vehicles come largely from special technical schools or up from the repair stations in which they have worked.

The development of an educational adjunct to provide technically trained men for service positions is a new and exceedingly interesting phase of the automobile industry. Among the manufacturers who have taken hold of the situation with a vigorous policy is the Packard



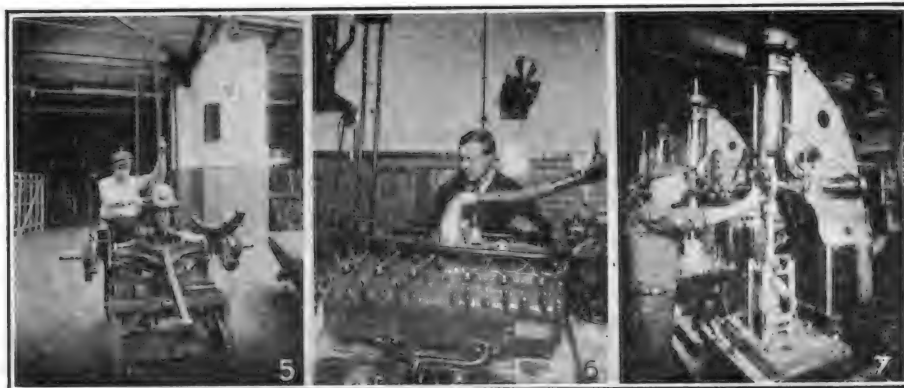
Key to Illustrations of Technical Training on Important Packard Twin Six Machining Operations: 1, Milling the Cylinder Blocks Before They Start on Their Journey to the Assembly Department; 2, Milling Four Clutch Housings at One Time; 3, Front Axle Under Battery of End Millers and Drills; 4, Assembly and Adjusting Motors.

production standpoint, the rise in demand for efficient service to car owners has so increased the call by the trade field for technically trained men that several companies have inaugurated schools at their factories, where employees can be taught the mechanism and service principles of their product. Those intimate with the business understand that with 58,000 dealer and repair establishments in the United States, and with the war depleting the shops, the dearth of technically trained men in the automobile industry is an intensely serious factor.

troit factory interior was shown, and its inspiration was simply because the fact was recognized that this was the \$5 a day place, though the picture was not labeled in that way. The shop need for men has grown enormously. Whereas the production of cars and trucks is given as about 194,000 in 1910, and increased annually until in 1916 there were about 1,700,000 manufactured, the need is seen. But the number operating was already over 500,000 in 1910; increased to more than 3,400,000 in 1916, and is even estimated to exceed the tremendous volume of 5,500,000 before this year.

Motor Car Co., which has just opened a new technical service school in its big Detroit plant. The plan of its operation allows remuneration to all students enrolled while they are mastering motor mechanism and service, and allows for increases in the earnings based upon the student's usefulness to the company while learning, his previous application to similar problems, his previous experience in mechanics and his previous technical education and training.

This school, established for the improvement of technical automobile service, is divided into three parts:



Miscellaneous Operations: 5, Assembling Differential of Rear Truck Axle; 6, Identifying Motor Sounds Detected by the Aid of a Stethoscope; 7, Drilling a Steering Knuckle.

1. Mechanical training and underlying principles.

2. Mental training that gives independence of thought in solving service problems.

3. General training in business to give better perspective to an employee.

A Fascinating Mechanical World.

To witness the mechanical operations in an automobile factory is almost a marvel to the uninitiated. They are a succession of applications to metals of the genius of the ages that weave a spell of fascination to the human mind. To see the raw material fabricated is almost as if one were standing on the threshold of Cinderella's house and observing the fairy godmother fashion the child's golden coach and liveried lackeys out of the base pumpkin of the story book. Modern industry and the automobile section in particular performs this mystic feat hour by hour and minute by minute, in the great shops that are devoted to the production of motor vehicles. Men turning a piece of steel under the ponderous hammers striking tons and tons at a blow; men guiding cutting tools on a product that must check up to within one-ten-thousandth of an inch, demonstrate the wide range of human skill that must be employed in the production of a coach that today all the world will ride in and look with disdain on Cinderella's gorgeous outfit.

To work and study at the same time

in the presence of so wondrous a mechanical laboratory as the Packard factories is a privilege of the age. Such students not only have these highly specialized machines and operations before their eyes, but they have the machines and the tools in their hands. Here, it appears, the everyday mechanic who comes up from the service shops for specialized instruction realizes that he has some very decided advantages. For despite the liberal, specialized equipment of regularly organized scientific schools, the ordinary technical student from a scientific school would be overjoyed if he could but get his mastery of shop operations in a commercially producing shop, and leave out the matter of getting paid for his time as regularly as the week rolls around.

Production of Technical Men.

The student who intends to be fitted to be a technical man is fitting himself to assume the responsibility of policy and conduct of the service office force, the handling of service customers, garage, inspection room, repair room, machine shop, forge and welding shop, paint and varnish shop, accessory repair room, upholstery and body shops, stock room, storage place or such other divisions as may be incorporated in the service establishment. To do this he becomes acquainted in a three months' course in brief but careful study on the following schedule:

Four weeks each in the car factory and the truck factory on the following subjects: Motor assembly, carburetor and clutch, transmission and axles, steering, chassis assembly, final repairs and tuning, motor repairs.

Two weeks in the main factory on the carburetor, electrical system and small parts.

Three weeks in the operating department on inspection of cars and trucks and testing cars and trucks.

A carefully worked out system, alternating shop work and class instruction makes this vocational education undertaken in an automobile factory in many respects unique. Never losing sight of the ultimate value to the motorist of the specialized skill and knowledge which is being prepared for the field, the combination of practical experience on the drill press, lathe and assembly platforms with lectures and class room instruction is constantly maintained. Without stopping for dress formalities, the learners pass directly from the machines to the blackboard and a seat in the class room for the mental drill, which fixes their manually gained knowledge of a few moments before and the increment of the same to be obtained the moment they pass out of the class room into the shop again.

Tripping Along with Car Production.

The wealth of mechanical facts which are presented to the view and reach of the student learner and from which it is possible to equip himself with stores of useful, practical information, is inestimable. He is in close touch with it all, as participant and observer. He may go with the cylinder blocks of the Twin Six engine on their first visit to the machine shop, where they receive the necessary machining and the main parts of the engines take on their refined form and finish before starting on their journey to the assembly department. He tarries at the station of the intricate and ingenious machines that make inaccuracies almost impossible in the drilling of the clutch housing.

He makes a detour, perhaps, and hangs over the multiple drills working on a clutch housing, where dozens of drills on one machine accomplish in a



Key to Illustrations: 8, Working with Multiple Drills on a Clutch Housing; 9, Inspection of Twin Six Cylinder After Boring with Gauge Checking to a Thousandth of an Inch; 10, Stockkeeping Where There Are Thousands of Bins Numbered and Contents Catalogued.



Key to Illustrations of Technical Training in the Truck Department: 11, Machining Operations on Motor Truck Crank Cases; 12, Motor Adjustment on the Conveyor Where Motors Are Assembled; 13, Where Truck Chassis Are Assembled and the Practical Points of Truck Chassis Work Are Obtained.

few minutes what used to take hours, demonstrating how man's effort is multiplied many fold by this machine. Or he is at another time at the station of the battery of end millers where the front axle takes on its final contour and passes on to a press, where all the necessary holes are drilled at one time.

In due time he is sure to be on the progressive assembly platform, where the crew of workmen is putting up and adjusting the Twin Six power plant. Here, starting with the cylinder blocks and base, the engine rolls along between rows of men until it passes off at the far end of the room ready for installation on the chassis. From these operations are obtained fine points of motor adjustment.

With the Engine Doctor.

Without attempting to follow all his opportunities and successive stations, it is, nevertheless, valuable, however, to go with him to his points of contact in several other places where skill is imparted to the hand and facts impressed indelibly on his mind for future usefulness. There is, for instance, the period of association and working with the engine doctor or inspector who diagnoses all the troubles in the Twin Six engine with a stethoscope. The training of the ear to identify motor sounds is a point of no small importance. In the factory this inspector detects any little sounds that indicate that all is not going according to specifications. He seldom locates any defects, but looks over every engine before it passes along, as all Packard power plants must be perfectly healthy before they are sent out into motordom. At other points in the operating department inspecting points are obtained and illustration 8 shows how some of the reading is done. While the boring machines work with great accuracy, delicate gauges and instruments are used in checking up the work. Inside surfaces of cylinders must check up to within one-ten-thousandth of an inch.

Following the Truck Units.

Access currently to the truck factory stimulates and rounds out the technical training of the Packard students on the side of future work on commercial cars. In the mechanical department he may be engaged in the maze of drill presses boring a hole in a truck steering knuckle as against the time of need out in serv-

ice work when accidents anywhere bring the knowledge of such operations into play. Or he is down where the crank case of the truck motor are fed up to the milling machines on rollers, where men no longer needlessly waste energy in carrying about heavy parts, for, when finished, the cases are lifted from the machine beds by pneumatic hoists and are transported to the station of the next operation by overhead tracks.

And then there are the days spent with the truck engine, which, fastened to fixtures, rolls along a track in the process of assembly and adjustment until it is completed, where the student is learning the methods and fine points of adjustment. Long rows of men attend the engine on its journey, putting its parts in place, and each man, by specializing in his one duty, works with great dispatch and accuracy. Then on into the big truck assembly room, where the various units are put together, and through the inspection processes which finally allow the finished truck to go out into service on its next and last move.

A Year of Such Opportunities.

Short courses of three and six months imply a considerable ground work of mechanical experience or business supervision previous to their taking up. So there is provided the one year's course, where time for shop work classes, lectures and examinations is multiplied until the ground work is prepared with special care, and the following schedule of it gives an excellent idea of the scope of instruction and the wealth of opportunity:

General machine shop, nine weeks—Drill press, milling machine, engine lathe, bench work.

Assembly and parts repair department, 10 weeks—Steering, axles, clutch, transmission, carburetor, cylinder and pistons, small parts.

Sheet metal, one week—Radiators, fenders.

Truck factory, seven weeks—Motor assembly, block test, dynamometer.

Car factory, 12 weeks—Clutch and transmission, steering, chassis assembly, final repair and tuning, carburetor.

Main factory, three weeks—Electrical, small parts, carburetor.

Service department, six weeks—Motors, repairs, cars; repairs, trucks; electrical.

Operating department, four weeks—Inspection cars and trucks, testing cars and trucks.

Business and Stock Keeping.

Besides the technical training obtained in shop experience, other time and study gives insight to the general conduct of a service station. Students are given a perspective on the relation of service to other departments of the dealer's business. Greater business capacity, executive ability and independence in solving all service station problems is the prime purpose of the course. In connection with detailed study of service principles there is the immense stock room where there are thousands of bins, each one numbered and so catalogued that attendants can procure any bolt, nut or part at a moment's notice and with practically no likelihood of making a mistake. The elements of systematic stock keeping inculcated here are without doubt of inestimable value. The stock depot side of the service problem has its special six months' course of training.

It is not without significance that the earlier years of the automobile industry was turned to perfection of product. It is equally inevitable that an era should come when the industry must turn its attention to the perfection of the service that a highly perfected product must entail. So it is not really surprising that the time has come to recognize the shortage of technical skill and take such steps to meet it as in this system the Packard company is developing. Every man accepted for the school makes contractual relations to insure that he applies his skill to the organization that polished up his earning powers for a period which will reimburse it for the outlay made. The school is open to all men who have had automobile experience and when a student has finished his course a position is found for him in a Packard service station or at the main factory, where he receives the prevailing scale of wages. Much of the work done by the student partakes so largely of the experimental nature that it cannot be regarded as productive and is not permitted to go into the construction of the actually marketable product.

The instruction thus afforded in distinctive automobile avocations well-nigh strikes a collegiate level. To the motorist it promises adequate, high grade service.

Overhauling *The* Automobile



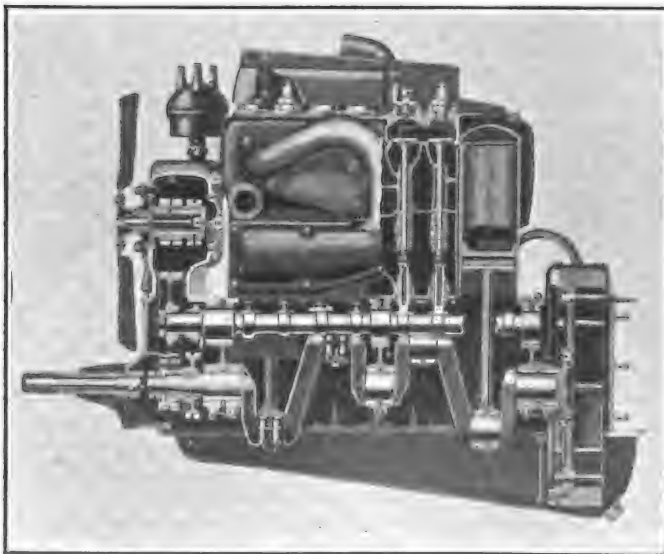
THE HUPMOBILE

This is the ninth of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The tenth article of this series will appear in the Nov. 25th issue of the Automobile Journal.

THERE have been a number of changes made in the past three years in the Hupmobile design, embodied mostly in the engine. Model K, which came out in 1915, differed materially from model 32 of the three years previous. Model N, or series N, as it is termed, was produced in 1916, and continued through the present year. Series N has no great differences from K, so that this article will cover both model K and series N machines, with illustrations from both types.

The chief point of difference between models K and N is the use of the single unit starting and lighting system on model K. The fan on this model is mounted on the engine block and driven by a flexible belt from a pulley, which in turn is driven by a silent chain. On model N the fan is mounted on the timing gear case and driven direct by the silent chain.

Aside from the above difference the mechanical construction is similar; though there were certain changes in sizes of bearings, wrist pins, valves and piston construction, the general directions for overhaul may be applied to both types.



Hupmobile Series N Engine, Partially Cut Away to Show Construction.

Before beginning the work of overhaul, it is best to give the radiating system a thorough cleaning. To do this, all of the cooling liquid should be drawn from the system and the system filled with a solution of water and washing soda, or water and potash lye. In many localities water used in the cooling system contains carbonate of lime, which, in time, is deposited on the jackets, and in the radiator tubes, reducing the efficiency to a considerable extent. Other impurities in the water may have a similar effect. The washing soda solution should be used where lime deposits are found; the potash solution for other deposits. In many cases a treatment of both solutions is advisable. Before placing these solutions in the radiator they should be strained through a cheese cloth to remove the lumps of soda or potash.

Points in Preparatory Cleansing.

After the cleansing solution has been put into the cooling system, the engine should be run for a few minutes until the solution has been thoroughly heated. It may then be drawn off and saved until the engine has been overhauled, then used again in the same manner. As soon as the solution has been drawn from the system the radiator should be filled with clean water and the engine started again. If possible, a stream of water should be kept running into the filler cap, the water drain opened and the engine left running until the system is thoroughly flushed.

Both the water connections should then be disconnected from the engine, the radiator unbolted from the frame and removed from the car. All of the wires leading to the engine, generator and starting motor should then be tagged and disconnected. The secondary wires leading to the distributor from the plugs may be disconnected from the plugs and with the distributor head removed from the car. Inspection of the inside of the distributor head should be made at this time.

Ignition System Adjustments.

In all ignition systems having a distributor unit with breaker box integral, there are a few adjustments that should be given careful consideration. The Atwater Kent contact maker, or interrupter mechanism, consists of a cam or notched shaft upon which rides a lifter bar. Resting against the lifter bar is a latch which presses against a contact spring. The contact spring is made in two pieces, one of which, called the tongue, is fitted with a platinum contact designed to register with a platinum contact screw, which is insulated from the base of the box.

As the lifter bar rides upon the notched shaft it presses against the latch and the contact points are brought together, forming a circuit (if the switch is closed) between the battery, through the coil and to the ground. As the notched shaft revolves the lifter bar drops into one of the notches and the contact between the platinum points is broken. This action sets up an induced current in the secondary windings of the coil and a spark is carried to the distributor and from thence to the firing cylinder.

With the lifter bar resting in one of the notches of the shaft the distance between the platinum points should be between .010 and .012 of an inch. As the shaft is turned and the lifter bar rides to the top of the shaft, and the points

come together, the tongue of the contact spring should separate from the spring hook about .012 of an inch. This assures the contact of the platinum points.

The latch mechanism, as well as the lifter, should be oiled frequently, care should be used, however, not to get oil on to the contact points. The contact points should be smooth on the faces and fit squarely together or the contact will be poor.

The distributor cap, or inside of the head, should be wiped with a cloth and if the contacts show signs of being burned the cap should be replaced with new. The contacts should be smooth and of a reddish brown color. A very small amount of vaseline may be wiped across each contact for lubrication if necessary. Too much lubricant must not be used, simply enough to dampen the end of the finger is sufficient for this purpose.

Lifting Unit from the Engine.

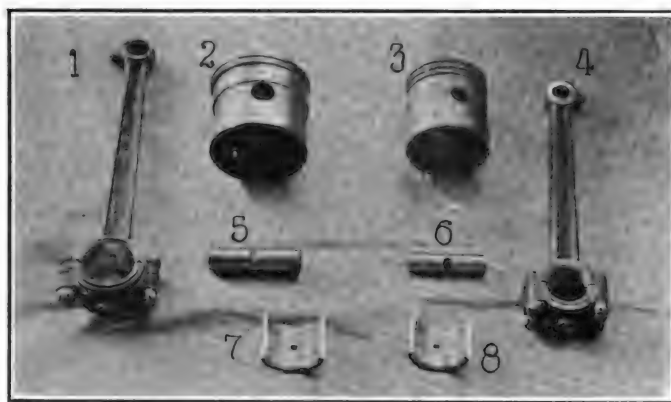
The distributor unit is fastened into the shaft housing by a set screw, which is located directly beneath the unit and at the top of the shaft. Loosen this screw and lift the unit from the engine.

The cylinder water header, which is fastened to the top of the cylinders by cap screws, should be removed and the cylinder jackets cleaned by the use of a stiff wire. This is important, since much of the iron scale and deposits from the water can be removed in this manner that could not be dissolved by the potash or soda solution.

Six nuts hold the exhaust manifold to the left side of the engine block; these should be removed and the two bolts fastening the manifold to the exhaust line taken out. The manifold may then be taken from the engine.

After the carburetor control wires have been disconnected the gasoline should be shut off at the tank and the carburetor, which is fastened to the cylinder by six cap screws removed.

The plugs over the valves should next be removed, giving access to the valve chambers. Through these openings the cylinders may be scraped free from carbon and the carbon removed from the valve pockets. This operation may be performed with a specially designed flexible scraper, which may be obtained from any supply department. The one point to remember in scraping carbon is to have the piston in the cylinder upon which the work is being done



Two Types of Pistons and Connecting Rods Used on Series N and Model K Engines. 1, 4, Connecting Rods; 2, 3, Pistons; 5, 6, Wristpins; 7, 8, Bronze Babbitt Connecting Rod Bearings.

near the top of its explosion stroke, so as to cover up all of the cylinder wall. At this position both the inlet and exhaust valves will be closed, preventing the carbon from getting into the lower part of the valve pockets.

After the 10 screws holding the valve stem covers into place have been removed the covers may be taken off, exposing the valve stems and springs.

With a valve spring lifter compress the valve springs and slip off the retaining washer which fits over the end of the valve stem. This washer is U shaped and is easily removed, releasing the spring, so that the valve may be taken from the block. Before taking the valves from the housing they should be marked, for if they are put into the wrong places it is a difficult matter to grind them so that a satisfactory fit is obtained.

The most careful examination should be given the valves, relative to the fit in the engine block. The valve stems should fit into the guides so that no air can leak

into the intake line, otherwise the action of the engine will be poor and uneven. If there is the slightest play between the stems and the guides the guides should be drawn from the casting and replaced with new.

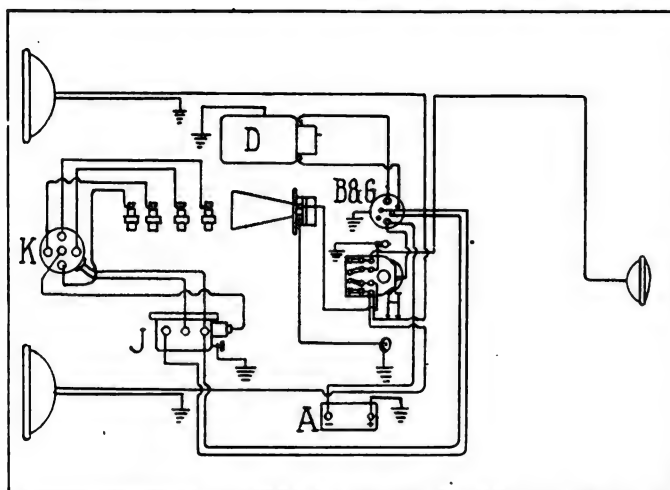
For grinding the valves a special Y shaped tool is necessary. The grinding compound, which may be obtained at any supply house, should be used but sparingly, and precautions should be taken to prevent it from entering either the cylinders or valve chambers.

After the valves have been ground the chambers, valve faces and ports should be given a thorough cleaning to remove any remaining grinding paste. The valves may then be replaced, the springs compressed and the retaining washers slipped on to the stems.

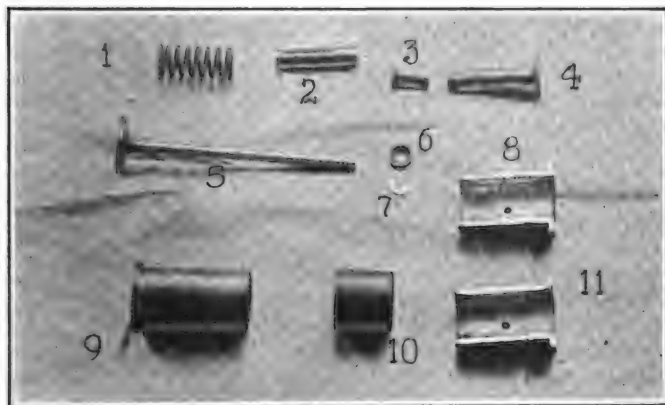
In the Lower Part of the Engine.

Drain the oil from the base of the engine by removing the drain plug located in the lower part of the flywheel housing and remove the oil pan. This will expose the lower part of the engine and the flywheel, in which is mounted the clutch.

Two types of connecting rods have been used, the first having a cap retained by four bolts, while the later type was fitted with but two. After the caps have been removed the connecting rod may be taken from the crankshaft and together with the piston removed from the engine through the crank case. The bearings for both types of connecting rods are babbitt cast in bronze liners. If the babbitt has been worn to a great extent the bearing should be replaced with



Wiring Diagram of Model K Machines. A, Battery; B and G, Starting and Ignition Switch; D, Motor Generator; H, Lighting Switch; J, Spark Coil; K, Distributor.



Valve Assembly Components. 1, Valve Springs; 2, Valve Guide; 3, Tappet Adjusting Screw; 4, Tappet or Valve Lifter; 5, Valve; 6, Spring Collar; 7, Retaining Washer; 8, 11, Rear Camshaft Bearing Parts; 9, Front Camshaft Bearing; 10, Centre Camshaft Bearing.

new. For small adjustments the removal of one or more shims permits the tightening of the rod upon the crankshaft.

Supporting the crankshaft are three main bearings. The caps of the two outside bearings, or the ones at the ends, are held by four nuts each, while the middle cap is retained by two nuts. These caps may all be removed and adjustments made without disturbing the crankshaft, though it is advisable to remove them one at a time, leaving the other two in place until the third is replaced. If there is evidence of wear on the babbitt to such an extent that the babbitt is very thin, the liners should be replaced with new.

As a general rule it is advisable to replace both the top and bottom bearing rather than to replace the cap only, since the wear is apt to be evenly distributed.

If the work of overhaul is to proceed any further the generator, motor, fan and oil filler cap or vent tube should be removed. These units are all retained on the engine by nuts or cap screws and may be removed very easily. Where the generator unit is driven by a silent chain the chain may be slipped from the sprocket when the generator bolts are taken off.

Removal of Engine from Chassis.

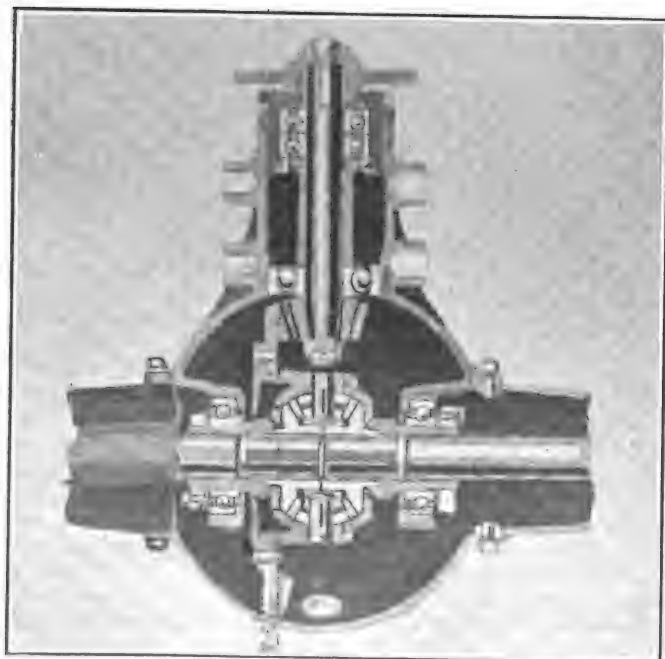
For further work on the engine it should be removed from the chassis. This may be done, together with the transmission gearset, or the engine may be removed separately. If the gearset is to be removed from the engine it should be disconnected from the rear system as directed hereafter.

The engine is supported at three points in the chassis. At the front end are two long bolts, which should be removed. The rear is fastened to the frame at the sides only. In order to slip out the engine it will be necessary to unfasten the steering gear from the frame and twist it to one side or lift it from the frame. When this is done the engine should be supported by a block and tackle. If the gearset is to be left in the chassis it should be blocked up either with boxes or horses so that the entire weight will not be brought upon the drive shaft.

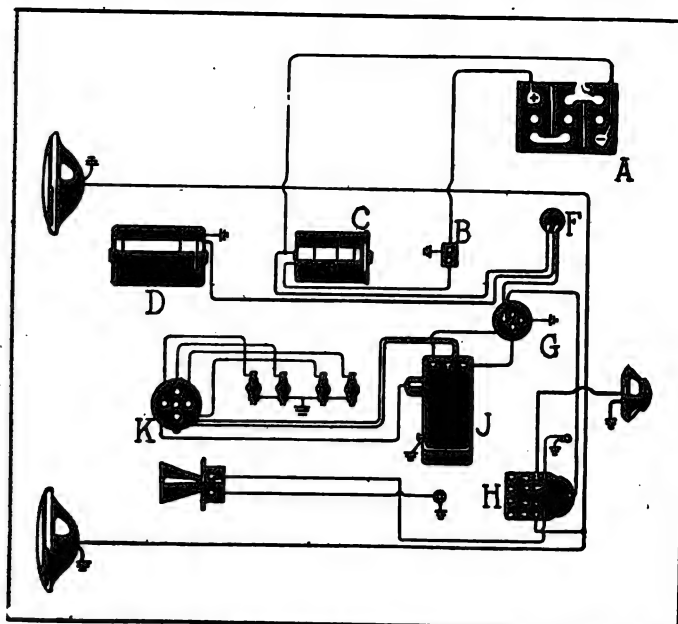
After the bolts which fasten the crank case to the transmission gear case have been removed, the engine may be lifted from the frame. If the facilities for lifting are inadequate the cylinder block, which is retained by six nuts on six studs, two at the front, two at the rear and two between number two and three cylinders, may be removed from the crank case. Then the crank case may be taken from the chassis as directed above.

Renovating Cylinder Walls.

Due to the present low grade of fuel, which contains a large percentage of kerosene, the cylinder walls of gasoline engines are subject to considerable wear. For this reason a



Cross Sectional Cut of Hupmobile Differential.



Wiring Diagram for Bijur System, Cars Up to 75,000. A, Battery; B, Starting Switch; C, Starting Motor; D, Generator; F, Ammeter; G, Ignition Switch; H, Lighting Switch; J, Spark Coil; K, Distributor.

careful examination should be given them. They should be inspected for scores or scratches, either of which cause loss of power and compression. Very fine scratches may be filled by the graphite method, while heavy scratches or scores should be filled by the plating process or ground out.

The graphite method of filling scratches is cheap and effective in many cases. After the engine has been reassembled it is applied as follows: With the engine running at normal speed, slowly pour about three teaspoonfuls of Dixon's flake graphite into the air intake. The graphite has a tendency to deposit on the walls and in the scratches and makes a temporary repair, which lasts for some time. Frequent treatment is to be advised. The cleaning of the spark plugs after this treatment is sometimes necessary.

Careful measurements of various cylinder diameters should be made and compared. If the cylinders are out of round it is advisable to have them ground or rebored.

Taking Apart the Timing System.

With the engine removed from the chassis the next step is the disassembly of the timing mechanism. The camshaft timing chains are enclosed in the front housing by two covers on the model N engine, a top housing which forms the fan drive enclosure and a bottom cover over the cam and crankshaft gears. On the model K engine the covers are divided across the centre, and may both be removed at this point. Only the lower cover of the model N can be removed at this time.

With the covers of the model K removed the adjustable eccentric on the fan drive pulley shaft should be turned until the chain is slack, then the chain may be slipped from the sprockets.

When the lower cover of the model N is taken off the driving chains are exposed. In the later models of series N the chain is fitted with a master link, which may be disconnected, permitting the removal of the chain. In the earlier models, however, there is no master link, so that it will be necessary to cut off one of the rivet heads before the chain can be taken from the machine. In replacing silent chains be sure to have the arrows, stamped on the links, point in the direction of the drive, or the chain will soon wear out. Care should be exercised in replacing the link to have it bear the same relation to the chain as it did before removal.

After the chain has been removed from the model N machine the upper housing, which carries the fan, may be unbolted and removed. The fan is keyed to the shaft and retained by a nut. After the fan has been taken from the shaft the eccentric bearing is exposed, retained by the fan

(Continued on Page 45.)

Die Schutzengrabenvernichtungautomobile

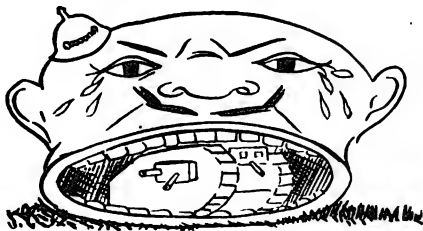


FIRST UNITED STATES MOTORIZED BATTERY WITH CATERPILLAR TRACTOR.

IN THE accompanying illustration we have a Holt 45 horsepower caterpillar tractor, a unit used in the United States army, the predecessor of the Allies "tank" developed in the great war and sometimes given credit for having furnished the idea which brought the enormous land battleships into being. For guns of smaller caliber a tractor hauls a section of artillery, which consists of a caisson and its limber, and a gun and its limber. The vehicles used for a battery are six trucks, the Holt 45 horsepower caterpillar tractor and a Dodge Bros. touring car.

MACHINES TO SUPPRESS THE SHOOTING TRENCHES.

"GERMAN Name for Tanks Is a 35-Letter Word" was the headline in the newspapers a few days ago over a Washington dispatch that told us the alphabetical requirements to spell the one word, which, in German, is equivalent of the four-letter English "tank," or land battleship that earned world renown at the battle of the Marne. The German word as it appears in official dispatches received at Washington is *Schutzengrabenvernichtungautomobile*, which, freely trans-



lated, is "a machine for suppressing shooting trenches."

Metaphorically stated the English tank is quite a mouthful for the Germans, both in execution and for the sake of mere reference to the machine when they wish to "strafe" it. The linguistic feat necessary every time a German names the hated machine is considerable. It requires the use of 17 characters from our alphabet, six of which are used once, while 11 serve in from one to four repetitions.

The accompanying illustration is a wireless view of what happens when Fritz, condemned to take a bitter pill, tries to say "tank."

SYRACUSE MOTORIZES ITS COLLECTIONS OF GARBAGE.

THE city of Syracuse, N. Y., is motorizing its department of garbage collection, having recently received two 3½-ton Sanford truck chassis that are equipped with specially designed bodies. The chassis are standard Sanford construction and the bodies are steel and are so built that the loads may be covered all of the time, save when loading. These bodies, as will be noted from the accompanying illustrations, are extremely wide and comparatively low sided.

On top of the bodies are flat covers that are in seven sections, three at either side and one at the rear end, which are raised or lowered by hand and which are supported by angle steel frames when lifted for loading. Any of the cover sections can be used individually, so that but a small part of the load may be exposed, and the odor and the spectacle of garbage and refuse are obviated as the trucks are driven through the streets. Both chassis are equipped with hydraulic hoists and the bodies are removable.

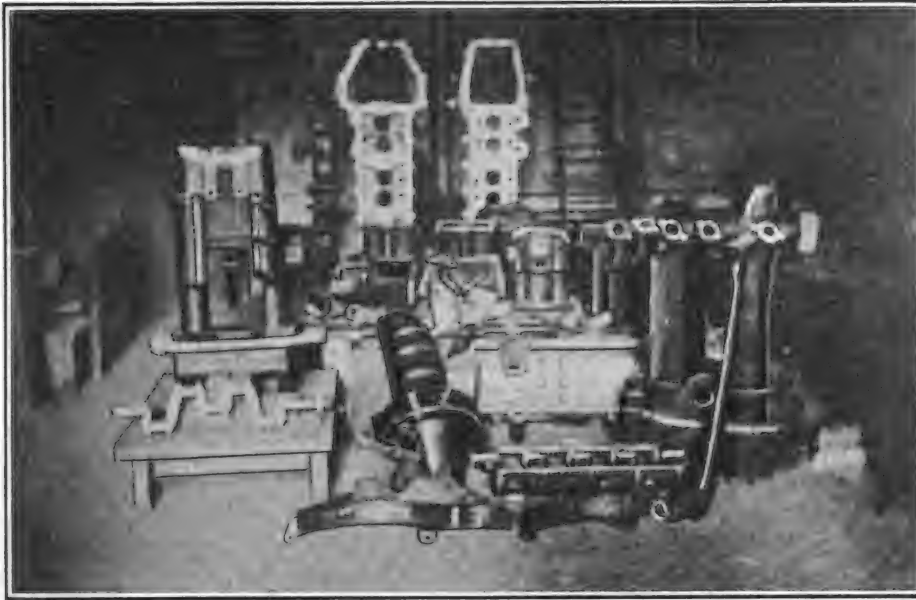
SPELLING THE DOOM OF CHATTER, GRAB AND SLIP



THIS is the Warner Manufacturing Company trailer about which visitors to the recent Ford Accessories exposition at Chicago heard so much at the Advance Automobile Accessories booth, where a set of cork insert linings was exhibited which had been in use on the car for 13 months. The firm states that with common brake bands previously in use the car was unable to haul successfully loads of more than 1500 pounds on the trailer, as the engine would often go dead when attempting to start the load. Also there was a decided chatter and racking noise in working the brake. After the installation loads of 2500 pounds were successfully hauled, with noises stopped.



The Woods Are Full of Flivvers, but These Sanitary Steel Carriers Are Guarding Public Health at Syracuse, N. Y.



A Few Automobile Parts Which Were Salvaged by the Capitol Welding Company of Providence, R. I.

NOW that the country is feeling the pressure of war and all the departments of the government are calling for conservation of this, that and the other thing, plant owners are thinking twice and scratching their heads before discarding a broken machine or a partly worn apparatus or tools of any kind. Through the various modern processes of welding—and especially through electrical and oxy-acetylene welding—machines, tools and materials are reclaimed and put back to work earning profits rather than being sold to the junk man for old iron.

The oxy-acetylene process being simple and comparatively inexpensive to install and operate, has found much favor with plants for conserving machinery and material. It makes possible repair jobs never dreamed of a few years ago. The present high prices for raw material, coupled with the inability to get new

machinery within a reasonable time, has sent plant owners scurrying for new processes that will help them keep the profits on the right side of the ledger.

An eastern plant that uses many tools found one day their scrap pile filled with disabled tools that represented thousands of dollars in lost profits. Reclamation was begun. Workmen were instructed to return all broken tools of whatever character to the storekeeper. The tools were then turned over to a machinist, who passed on whether or not it would be profitable to reclaim them. As a rule it was found that by welding or "filling in," repairs could be easily and quickly made at a small cost.

Under the oxy-acetylene process, for example, the combination of oxygen and acetylene produces a heat of 6300 degrees

Fahrenheit, and fuses two pieces of metal, invariably leaving the weld as perfect and strong as the other parts.

The advantage of either the electric or oxy-acetylene processes is that the welding can be done often with the broken parts in place, without dismantling the machine, thus saving valuable time and much extra labor.

An automobile manufacturer in a middle western city found there was a big leak in the making of certain castings, through the practise of many castings with only minor defects being thrown aside as worthless. These losses were overcome by oxy-acetylene welding,

Oxy-Acetylene Welding for Automobiles

which was used to fill up slight holes and in building up parts thinned by careless pouring, all at a cost much less than remelting and recasting.

Boon to Automobile Makers.

Another automobile manufacturer rescued a large number of housings for gear shafts which were filled with pinholes. The holes were filled by adding metal under the oxy-acetylene flame, which fused the new metal with the old and made a perfect job. To spoil or damage a nearly completed piece of work costs money and, where it can be made over at slight cost, another leak in profits is stopped.

In another automobile factory there was the case of a six-throw crankshaft, which, in the final turning operation, was marred by the slipping of the lathe tool, which gouged a piece from the journal. It would have been inadvisable to have finished the crankshaft, leaving a deep scratch, and the valuable shaft



Broken Frame Member Being Prepared for Welding While on the Car. Courtesy of Prest-O-Lite.

would have been lost if the welding torch had not been called into play. Metal was added, filling the scratch, and the journal was put through the usual finishing operations and proved an entirely efficient, sound and effective member.

In the realm of breakage in motor-dom, manufacturers and repairers find oxy-acetylene welding an invaluable claimant. When, through accident the cylinder, water jacket, crank case or supporting lugs are broken, the castings may be restored to their original condition. Frame members, damaged by shocks and overloads, can be repaired in many instances while on the car, both



Valuable Cylinder Casting Before and After Welding; Water Jacket Cut Away to Permit the Welding of the Cylinder.

Miracles of the Modern Salvaging Tool

saving time and eliminating losses in the working use of the car.

Many manufacturers have adopted the welding method of joining two housings in preference to using rivets. In many cases this gives better results and may be accomplished in shorter time than the riveting operation. Welding repairs are extremely practical in rear axle casings where the brake or wheel drums and the differential housings are fastened to the shaft housings.

Discoveries of Efficiency Engineers.

Efficiency engineers have long contended that the best way to save tools, machines and material is to reclaim them and use them over again, if it can be done at a profit. Of course if shops were still dependent on the old forge idea for welding, this salvaging would be out of the question, but modern engineering



Portable Oxy-Acetylene Outfit, Showing Gas Tanks Set Up and Operator Applying the Torch to a Break.

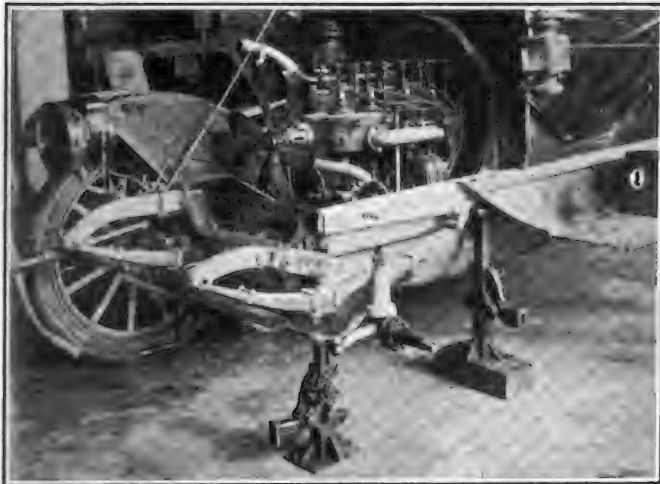
worth \$9 each, which could be welded and put into service at a cost of about \$1 each. The mining company was on the anxious seat, too, as to when it would be able to get more new material. It was found that the scrap heap would yield a three months supply of good material in a year's scrap accumulation.

At another time the engineer found a year's supply of tram buckets, worth \$40 each, with broken bottoms, that could easily be repaired by welding at a slight cost. In addition he found a three months' supply of stamp stems and short ends of tungsten steel,

of metal machines and tools that formerly were sold as waste, and at a fraction of the original cost. Nowadays any kind of metal—steel, iron, both cast and malleable, brass, bronze, copper, aluminum, sheet iron and precious metals such as gold, silver and platinum can be welded and broken parts made as good as new.

A railroad company had a big accumulation of scrapped driving wheels for locomotives, most of which had cracked spokes. The demand for more rolling stock, caused by war pressure, caused the company to reclaim these wheels and the oxy-acetylene welding process did the work, saving the road several thousand dollars and making it much more in profits through putting discarded engines to work.

America is said to have the biggest scrap heap in the world, but as conservation is the scrap heap's worst enemy, it is expected to be greatly reduced before the war is over.



The Broken Frame Member Shown on the Previous Page is Here Shown Restored. Courtesy of Prest-O-Lite.

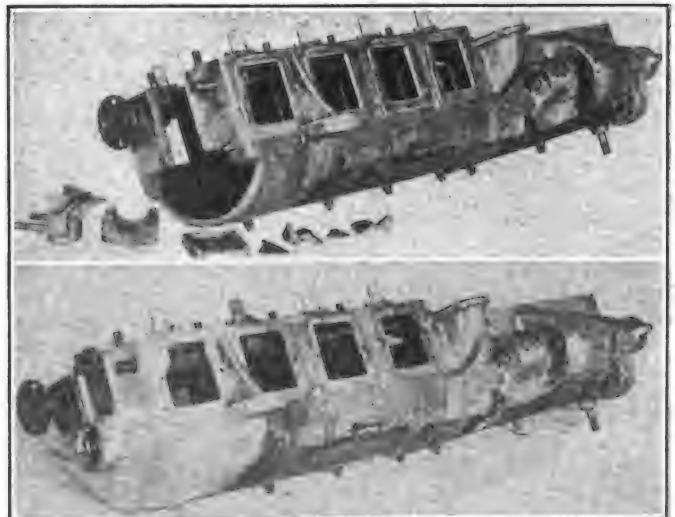
has shown the way out and is rapidly promoting the use of the electric and oxy-acetylene welding processes.

In one plant, stub ends of nickel anodes, used in electroplating, were sold as scrap at a low price to get rid of them until it was found feasible to weld them together and thus use up every bit of the material at an enormous saving. It was like sticking a small piece of soap, left from the old bar, onto a new cake and getting 100 per cent. use of the article.

In ordinary times the scrap pile is a neglected avenue for the escape of profits. Recently an engineer for an oxy-acetylene concern made an investigation in a western mining field. At one big mine he found in the scrap piles dollies and dies for drill sharpening,

which could be welded and give a year's supply. He found crusher plates manganese steel worth \$20 each, slightly too big for the machines then in use, but which could be cut down by the oxy-acetylene process at small cost and put into service again at an enormous saving.

The various processes of welding have made it possible to reclaim an enormous amount



Badly Broken Aluminum Crank Case Before and After Salvaging with the Oxy-Acetylene Torch.

Doble First Fifty Announced

Initial Series of Steam Car Arranged to Follow This Assembly at the New Plant

THE Doble-Detroit Steam Motors Co. has 50 Doble passenger cars in process of assembly at the new plant. Abner Doble has been demonstrating and testing out the new cars and production on the first series of 2500 Dobles will begin immediately.

The new Doble-Detroit four-passenger sport car, one of the models chosen for our illustration, is one of the most distinctive body designs brought out so far in the new season. A full stream line effect is carried out to a point near the centre of the body, where there is a cut-away, and the lines lead out to the rear on a level considerably below those of the hood. Between the front seat and tonneau there is a deck extending across

heads the company and Russell A. Alger is vice president. Philip M. McMillan was elected secretary and treasurer.

AN ASTONISHING REQUEST TO CURTAIL PRINTING PRESSES.

Five big steel companies, one big cement company and five big companies in the railway supply business and allied lines, join in a request to the trade press to support their decision not to send out Christmas and New Year's cards this year. They decided that it seemed sheer waste to spend money for such unnecessary and unproductive things as holiday greeting cards, and propose to collect several hundred thousand dollars spent

labor, is put to every resource to keep, if possible, "business going as usual."

The Universal Portland Cement Co. sent out the request to trade paper editors to give the movement "proper publicity," asking their help to present the idea to the readers of their papers and support it by editorials. The companies signatory to the compact in Chicago are: The Illinois Steel Co., the Morden Frog and Crossing Co., the American Steel and Wire Co., the Universal Portland Cement Co., the Lackawanna Steel Co., the Carnegie Steel Co., the Inland Steel Co., the Chicago Railway and Equipment Co., A. M. Castle & Co., the P. & M. Co., the A. J. O'Leary & Son Co.

It might be well, until the time at least that the government separates the essential from the non-essential business, to buy and send just as many Christmas cards as possible to firms and to boys in the trenches, consistent with the many sacrifices people are making to help the sick, suffering and needy who are brought into their deplorable condition by the monster war.

DE PALMA MAKES NEW RECORD.

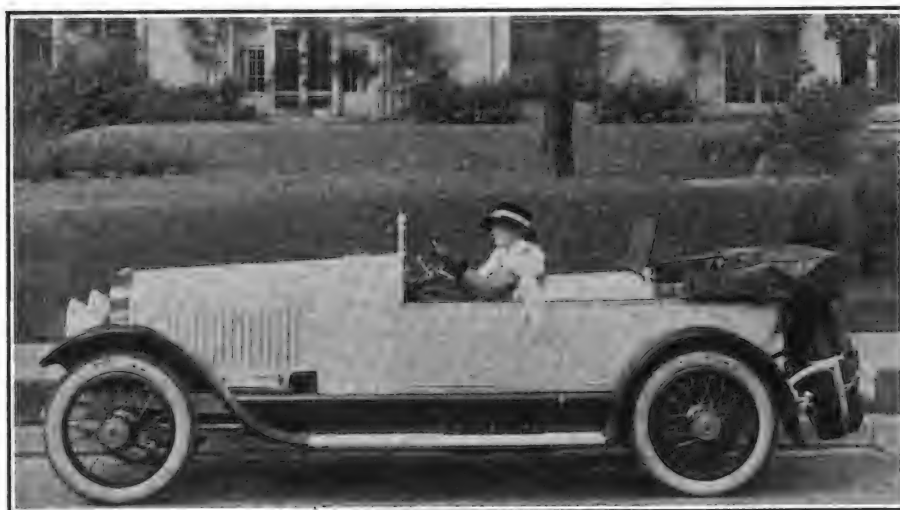
Ralph De Palma established a new world's record at Sheepshead Bay on Nov. 3 when he drove his Packard 10 miles in 5:17.41. The trial was officially supervised by the contest board of the American Automobile Association.

HARTFORD NOW ON MOTOR ROW.

Announcement is made of the removal of the Chicago branch of Edward V. Hartford, Inc., to 1716 Michigan boulevard, the heart of Chicago's "Motor Row." In this new location ample space is afforded for attractive sales rooms, the western executive office and the Hartford service. The overwhelming increase of business and the inadequacy of space in the former location, nine blocks farther south, necessitated this removal northwards.

The sales room display includes ready to fill orders, a complete stock of Hartford shock absorbers for all car models. For the trade a 25 set locality proposition, which enables dealers to carry a stock to fill orders for car models most numerous in their territory without overstocking, as all orders are filled from the factory with complete ready to be attached fittings, accompanied by blue prints for each car model, for the equipment of either a set or a half set of Hartford shock absorbers. Also on display are the Hartford bump absorbers, which are more than bumpers, as they are both front and rear accident preventers, taking care of the shock through their flexible and giving qualities. The bumpers are shipped to dealers in handy, individual cartons. Hartford auto jacks also are a reliable, necessary accessory, established in popularity and used extensively among motorists.

The Hartford line is exceptionally well located for service, as a wide alley in the rear intersecting the block between 17th and 18th streets affords ample space.



Classy Sport Model of the Doble-Detroit Four-Passenger Steam Car, with Mrs. Doble at the Steering Wheel.

the car from side to side and for a considerable distance back in the tonneau, and it carries a second windshield, which is also adjustable.

The chassis is the regular Doble-Detroit with Abner Doble's steam power plant.

BIG PACKARD EARNINGS.

The Packard Motor Car Co. during the fiscal year ending Aug. 31, made net earnings of \$5,400,691. The net earnings after allowing for all depreciation charges and for dividends on the preferred stock show a balance equal to 40.9 per cent. on the \$11,840,930 of common stock outstanding.

The report was made at the annual meeting when all the directors were re-elected as follows: Frederick M. Alger, Richard P. Joy, Russell A. Alger, Philip M. McMillan, Alvan Macauley, Henry B. Joy and Truman H. Newberry. The directors re-elected the board of officers without change. Alvan Macauley again

annually on this form of advertising and give it to Red Cross organizations to help the sick, wounded and starving throughout the world.

A higher and more noble purpose could hardly be conceived. A more worthy economy could hardly be planned.

From the printer's standpoint, however, how does it appear? He does his "bit" regularly printing free ads. for the Liberty loan, food conservation and like government inspired movements of all consuming importance. Now, in addition, a misguided economic idea in a great, patriotic, business enterprise asks him not only to forego Christmas card printing contracts, but, further, to turn the publicity guns of his own making upon himself, his paper making friends, his engraver friends, their sales forces and hundreds of thousands of others employed in his own and allied lines, who, unlike the steel companies who have so much business forced upon them by the war that they do not know where to get

Motor Clothes For

The Motor Woman



Above: Attractive Motor Coat of Plaid Patrick Cloth of Great Comfort and Durability, shawl collar, pockets and belt. Courtesy F. A. Patrick & Co., Duluth, Minn.

Below: Youthful and Trim Straight Line Motor Suit, Developed in Broadcloth, Adjustable Collar and Cuffs of Skunk Fur and Velvet Hat Trimmed with Ribbon and Coque Feather. Courtesy Franklin Simon & Co.



The Florette Veil, a New Fall and Winter Model. Courtesy E. & Z. Van Raalte, New York City.



Wonderful Toga and Muff of Mink, With Linings of Brown Pussy Willow Silk. Posed by Lubowska, the Noted Russian Dancer. Courtesy Balch, Price & Co., Brooklyn, N. Y.

By MRS. A. SHERMAN HITCHCOCK.

TO THE well dressed woman smartness in her motoring costume is essential. Wherever she goes—to the Thanksgiving reunion, to the country club dance, to the theatre or opera or motor show—if it is within motoring distance she is almost certain to go by motor. Thus her choice of a motoring costume assumes greater importance than it would appear, for it must not only be a costume for motor wear, but one which will be suited to the destination at her journey's end as well.

The mere mention of motoring clothes



Above: Charming "La Vogue" Model of Gunnyburl Cloth; Colors, Reindeer, Taupe, Green, Brown, Navy; Large Divided Cape Collar, Held with Loops and Convertible Into a Shawl.

Below: Motor Coat of Patrick Cloth, Made with High or Low Collars. Features, Extra Wide Convertible Cape Collar, Wide Belt, Deep Pockets. Courtesy F. A. Patrick & Co., Duluth, Minn.



a few years ago typified eccentric dressing. All the garments designed for the woman who motored possessed one quality in common—a total lack of beauty or smartness, but happily those days are in the past, and now motoring clothing is selected with quite as much attention to their smartness and becomingness as are any others.

Many of the new and smart motor coats are admirable examples of models which are suited not only for motoring, but for many other uses as well. Distinctive in cut they have unusual charm. To be clad in some of the lovely new wools, with trimmings of fur, is to give cold weather a warm welcome. Among the best grade of materials that combine the quiet elegance of quality with style distinctiveness are Reindeer Cloth, Gloveskin Cloth and Suede Twill. They are made in such delectable colorings, lovely browns and greens and blues and grays in their new shadings and with their new names and all with the soft bloom that the velvet finish gives to wool and that adds so greatly to the charm of any color.

Many Stunning Motor Models.

There are quantities of stunning motor models in these particular materials, both fur trimmed and without fur, while the fur fabric is being taken just as much for granted this winter as any other trimming, and there are wonderfully good imitations of chinchilla, Hudson seal, mole, broadtail and kolinsky that are really astonishing. Among the wool coats intended for all winter wear in the motor are models lined with plush or with fur fabric. This is an entirely new whim of Fashion's, but the cozy plush lining is vastly comfortable and has that soft and cozy feeling that the fur lined coat conveys. The Suede Twill is just what the name implies—a distinct twill with a suede finish. Lovely shades in this material are Artist brown, wine, Hague, Mysterious green, mole and prunelle. Reindeer Cloth is a beautiful velvety surfaced material and comes in Castor, Dreadnought Gray, Khaki, Havana, Covert, Russe, Taupe, Prelat and Amethyst. The Gloveskin Cloth has also the velvety surface with possibly a trifle more of a glow in its makeup. Charming colors are Lanvin red, beige, rose taupe, Marie Louise, mahogany, midnight blue and black. Of course these materials also come in the standard shades, as navy blue, tan, black and tete De Negre. Their wearing qualities are wonderful and at this time when war needs have made such a demand upon the woolen market we may consider ourselves very fortunate to be able to procure materials of such exceptionally fine quality. It is highly important at the present time that every woman should be most particular in her selection of both materials and garments and to make sure that they are of first class quality if she expects the service she should have. There are really only a few materials that could conscientiously be recommended in the wools that are purchaseable nowadays.

For the woman who drives her own

car there is a most excellent Leather Reversible Coat, made from selected sheep skins, lined in either gabardine or tweed material, which may be worn either side out. It has very smart style and will appeal to the motor woman. Another smart garment is the Brigadier, made of gabardine and lined with wool fleece and is detachable. It is thoroughly weather and wind proof, very light in weight, warm and durable. In style it is patterned after the coats which have been in use on the western front since the beginning of the war.

Dressy, Closed Car Coats.

So many motorists use the closed car during the cold season that it is not to be wondered that the motor coat for limousine and sedan use is in high demand, and these coats must necessarily breathe an air of dressiness along with their practicability. Wraps of this character come on cloak lines and there are also seen some stunning evening motoring cloaks on the lines of the old fashioned circular and of those built after the capes used in the Italian army—some made very ornate with strapings of gold and silver braid. The coats of this character are usually of Georgette Satin, a wonderfully well wearing material and beautiful in its appearance. This Georgette Satin has so many things in its favor that it is quite impossible to realize them all until one has owned some garment made from it and enjoyed the satisfaction derived from its use. The colors are lovely—coral, bisque, mignonette, canterelle, silver, Elsie blue, marron taupe, prunelle, Lauriers, arbre and Noir. These coats may be lined with chiffon velvet or satin veiled in chiffon. Even some cloaks of Georgette Satin are made unlined with the seams flatly tailored. In most instances there are large collars of fur and sometimes the fullness is loosely gathered at the waist and has a girdle of heavy silk cord.

Materials for Frocks and Wraps.

A smart little frock built especially for motor wear under the fur coat is of Milan green Kitten's Ear Crepe, which for elegance, durability and comfort cannot be excelled. The sleeves are long and tight fitting, while the unbelted straight front has its fullness held in at the back by wide black satin ribbon, which ties at one side in soft loops, and is finished with long silk fringe. Another is of Marine blue and is straight and loosely belted, its only trimming being buttons and silk tassels. The particularly attractive colors in the Kitten's Ear Crepe are Noir, Marine, Milan, Comete, Riviera, Chair, Ivoire and Pommer. Georgette Satin is also used with splendid success for motor frocks.

A splendid wearing material, which possesses a rich, lustrous appearance and is ideal for either frock or wrap is the lovely new Waterside Corduroys. They come in all the new colorings and distinctly new wales. The Petuna is the very narrowest imaginable wale and is very soft and pliable. In beaver, Russian, fern, Tabac and taupe it is particularly lovely. One especially admirable

feature of value to the motorist is that the Waterside Corduroys do not crease or wrinkle in the least. Any woman with motoring experience knows exactly what this means. Even after constant wear on a long distance tour this corduroy does not lose its freshness, something which can be said of very few materials. As materials form the entire base of our complete wardrobe, too much attention cannot be paid to their selection and it is not only well to know where to buy, but most important to know what to buy.

What do you think of the new Patricks for women motorists? The serviceability of these garments is unquestioned. The wool used in their manufacture is of unusual quality and comes from the northern sheep, which are given a thick, warm covering to protect them from the intense cold. The Patrick cloth gives great warmth with little weight and resists wind, cold and moisture excellently. They come in both plain colors and in plaided effects, combining sombre and gay forest shades.

Motor Dress Accessories.

The Florette veil is one of the new and distinctive patterns of the season, and comes in all the staple and new shades. It gives all the protection ordinarily necessary and also adds a dressy effect to the costume. In some instances the veils are attached to the motoring hats, but in the majority of cases they are bought as a separate affair and the choice is very wide. One of the new veils has a large hexagon mesh with the motifs so arranged that they cover one side of the face or fall against the chin or partly eclipse one eye. The new motifs are largely of flower design and among the most popular are the Bokay, Vixen, Shirley, Dania, Gloria and Sammy. These may be had in many smart shades to match the hat.

Motor Hoods Coming In.

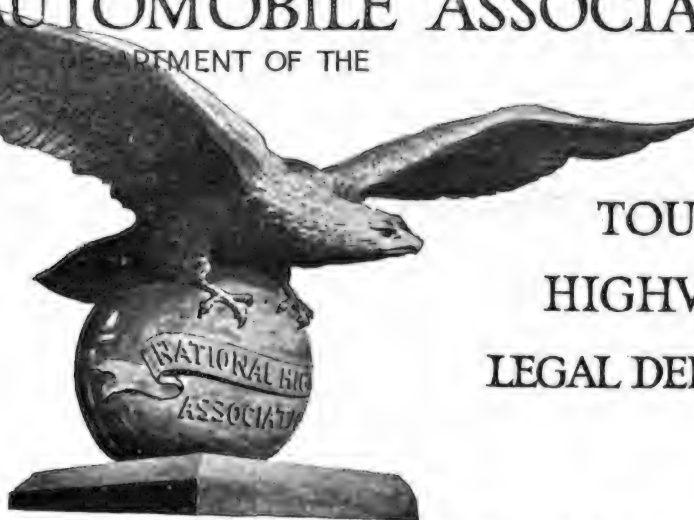
The motor hood is coming into its own again and I have seen some charming models. One is of white fox fur, lined with violet chiffon shirred all around the face, and long ties of five-inch violet colored velvet ribbon. Where the ties were joined to the bonnet at each side was a cluster tiny velvet violets. Another model is of khaki colored duvetyne, edged with brown fox and tied with brown velvet ties. A hat of coral Georgette satin resembles in shape the high Russian head dress and has a cache-nez collar attached, which renders it particularly admirable for motoring. The satin drapery falls gracefully down to encircle the throat and ends in a bit of a twist on the left shoulder. A little round Chinese motor hat is built of caracul and has a cocarde and two stiff ends of bright blue velvet. A model, medieval with its corical shape and trailing veil of chiffon cloth derived from the hennin, is made of finely plaited Elsie blue Georgette Satin. The crown climbs to a point from a narrow little brim and from the tip top springs a pompom of fur. The veil is attached in such a manner that it may easily be adjusted over the face or flung back if desired.

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DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Points on Touring Routes to Southern Camps

THE New York manager of the Touring Bureau of the American Automobile Association, who has just returned from the southern military camps, has issued the following relative to routes running south from New York City:

Our first objective was Camp Dix at Wrightstown, where is stationed the national army from upper and Western New York state, and the northern part of Pennsylvania. We found a generally good road via Newark, Elizabeth, Rahway, Perth Amboy, South Amboy, West Keyport, Matawan, Freehold, Lakewood, Cassville, New Egypt and Cookstown. Owing to the large amount of traffic the last few miles of this road is getting very much worn. From Wrightstown we went through Pemberton and Mount Holly, Moorestown, Merchantville to Camden, and took the ferry to Philadelphia.

From Philadelphia to Camp Meade we found an excellent bitulithic road as far as State road, Delaware, with the exception of a short stretch just north of Wilmington. From the state road there is a dirt road through Glasgow to Elkton, and a short detour at that place, where a new bridge is being built. From Elkton the road is in excellent condition through Belair and Baltimore to the village of Savage, where a turn is made to the left for Camp Meade. The four and a half miles to the camp from Savage is ordinary dirt and somewhat narrow. At Camp Meade is stationed the national army from the southern part of Pennsylvania.

From Camp Meade we followed a dirt road to Laurel and then a good bitulithic road to Washington. We left Washington via the Long bridge and

REPORT ACCIDENTS TO THE ASSOCIATION.

Many of our members when they are involved in any kind of an automobile accident make reports thereof directly to the Massachusetts Highway Commission. As the present law provides that every operator of a motor vehicle which in any manner is involved in an accident in which any person is killed or injured shall report the same in writing to the Massachusetts Highway Commission, it is suggested that reports need not be made when only property is damaged. Moreover, it is deemed advisable that all reports of accidents should first be submitted to the general counsel of the association for his consideration and approval.

found an excellent road to Alexandria. Fourteen miles from Washington we left this road and followed a good gravel road, which goes through Accotink, Lorton and Occoquan to Agnewville. From Agnewville to Dumfries the road is rather rough, though passable even in rainy weather. Beyond Dumfries there is now a graded clay road, which is in fair condition across the old Chapawamsic swamp. The balance of the way to Richmond is mostly over a good gravel and sand clay road, which, however, becomes rather rutty beyond Mantico.

From Richmond to Petersburg, 22 miles, the highway is a worn out gravel road, but is passable under all weather conditions. Two miles from Petersburg is Camp Lee, where is stationed the national army of the states of Maryland, Virginia, Delaware, New Jersey and the District of Columbia. From Petersburg there is a sand clay road, mostly in good condition to Clarksville, Va. Leaving

Clarksville there is a macadam road of five miles to the state line, which is somewhat rough, but is now being resurfaced. From the state line to Durham the road is generally fair graded clay, with stretches of good sand clay coming into Oxford and Durham. At Durham we turned westward and passed through Hillsboro, Mebane, Graham and Burlington to Greensboro. The greater part of this is a sand clay road, which is in poor condition a large portion of the way. It is, however, passable, and in the larger towns will be found good concrete and paved streets.

From Greensboro we turned south on the national highway on a good road to High Point. From there to Charlotte the roads are in generally good condition, though there is a rather poor stretch immediately south of Salisbury. Three miles from Charlotte is Camp Greene, where is stationed the National Guard from most of the New England states. Camp Greene is on the finest road to Spartansburg, and is but a short distance from the town. As far as Kings mountain the road is in excellent condition, but becomes very poor and rough from there most of the way to Spartansburg. Camp Wadsworth, about four miles from Spartansburg, is made up of the National Guard troops of New York state.

Spartansburg to Greenville is over a graded clay road, which is in generally good condition. Camp Sevier is northeast of the city on the main road coming from Spartansburg. From Greenville to Atlanta the roads are in generally fair condition throughout, with some stretches rather poor. Camp Gordon is about three miles from the city and is easily accessible. Here is located the

national army from the states of Georgia, Kentucky and Florida. Four miles south of the city is Fort McPhearson, where the German sailors are interned.

From Atlanta to Anniston the roads were found only in fair condition. Camp McClellan, at that place, is made up of the National Guard troops of New Jersey, Virginia, Maryland, Delaware and the District of Columbia. Returning to

Atlanta we followed a very fair sand clay and gravel road to Augusta. Camp Hancock is very nicely situated near the city and the National Guard troops of Pennsylvania, stationed there, find it very easy to come to town whenever permitted. This is one of the choice locations and the troops at Camp Hancock are envied by many of the troops of other camps.

Traveling over a very fair sand clay and gravel road, our next stop was at Camp Jackson, Columbia, S. C., where we visited the national army of Tennessee, North and South Carolina. This ended our cantonment tour and we returned over a very fair to good sand clay road through Camden, Cheraw, Pinehurst, N. C., to Durham, where we joined our southward route.

To Stop Reckless Driving of Automobiles

THE reckless operation of automobiles by men under the influence of liquor is increasing, according to the records of the Massachusetts Highway Commission, notwithstanding the severe penalties imposed by law. In a summary of deaths, injuries and accidents in which all types of motor vehicles were involved, for the first nine months of the fiscal year of 1915 and 1916 (Dec. 1 to Aug. 31, 1916, and Dec. 1 to Aug. 31, 1917), a total of 280 persons were killed and 4752 were injured this year as compared with 176 deaths and 5763 injuries during last year. Among those injured or killed pedestrians take first rank, while occupants of motor vehicles come next. One hundred and fifty-six pedestrians were killed this year as compared with 38 in the same class during a like period last year. Deaths due to motorcycle accidents increased from nine last year to 22 this year. Six occupants of carriages were killed this year as against two last year. Injured persons far outnumber the dead in nearly every automobile accident. Pedestrians to the number of 2751 were more or less severely injured during the past

nine months, while 2944 were injured in motor vehicle accidents in the first nine months of 1916. In the motorcycle class 1033 persons were injured this year as against 1428 last year. In the bicycle class 471 were injured this year as against 601 last year. In the class of occupants of carriages 144 were injured this year, and more than twice that number—311—last year. Only six street car passengers suffered in the automobile accidents since last December, as against 26 the year before.

The greatest number of accidents occurred in collisions between automobiles; the next greatest number took place when pedestrians stepped from the sidewalk into the path of an automobile. There were 6192 accidents in this class in the last nine months as against 5164 for the previous period. In the person against the machine class there were 2885 encounters this year, while there were 2996 for the same period last year. In the carriage and automobile collisions there were 1112 last year and 740 this year. Between bicycles and automobiles there were 425 last year and this year 3196. Between automobile and

trolley cars 735 last year and 507 this year. Between automobiles and curbs, telegraph poles and the like there were 913 last year as against 711 this year. Between railroad trains and automobiles there were 22 accidents last year and 196 this year. Most of the automobile accidents occurred in the day time and in the larger cities and towns. Among the most serious accidents, however, are those which occurred at night on country roads. This class of accidents being more or less directly attributed to "joy riding."

The department is exerting every possible effort to stamp out reckless driving and the operation of motor cars by persons under the influence of liquor. During the three-quarters of the year 503 cases were prosecuted in the courts on the charge of operating a motor vehicle under the influence of liquor. In cases where reckless driving has been charged the department has had 200 persons prosecuted this year, while last year 292 were prosecuted for operating motor vehicles while intoxicated and 196 for reckless driving.

One hundred and sixty-four persons were prosecuted this year on the charge of using motor vehicles without authority, as against 83 last year on the same charge. On the charge of endangering the safety and lives of the public 193 were prosecuted this year and 115 last year, and in cases where motorists were charged with failure to stop after injury, 85 persons were prosecuted this year, as against 52 last year.

That the highway department is in earnest in its aim to rid the highways of reckless and drunken drivers there is no better evidence than the fact that last year there were a total of 678 of the department's prosecutions as against 1152 this year.

CONNECTICUT LICENSES.

Applicants for licenses to operate motor vehicles in Connecticut may in the future be required to pass a "skidding" test.

Commissioner Stoeckel of the State Motor Vehicle Department says that a large percentage of serious accidents are due to skidding and investigation has shown that skidding results from failure to use chains and also from lack of proper driving knowledge. He adds that in ordinary driving apparently little use of the hand brake is made, so that in an emergency a driver does not revert to it.

General Counsel's Letter Box

WE HAVE received the following letter from the chief of police of Newton, Mass., whose plea we earnestly commend to the serious consideration of all motorists:

National Automobile Association,
9 Park Street,
Boston, Mass.

Gentlemen:—

My attention has been called to the large number of automobilists who do not comply with the law, which requires the rear number plate to be properly lighted.

In some instances it is doubtless due to carelessness, or ignorance, but in other cases there is a definite purpose to escape identification.

Would it be possible for you to caution the members of your association who are delinquent in this respect to obey the law, as we prefer to prevent rather than to have the law violated and then to prosecute in the police court.

Any assistance which you can render me would be appreciated.

Yours truly,
FREDERIC M. MITCHELL,
Chief of Police.

The Commonwealth of Massachusetts.
Massachusetts Highway Commission,
Room 212, State House, Boston.

Oct. 30, 1917.

Mr. Francis Hurtubis, Jr.,
General Counsel, N. A. A.

Dear Sir:—

Our board is trying to register and get out of the way every auto possible during November and early December in order to reduce the great pressure in late December and early January. Many thousands of blanks have been mailed to owners of autos asking them to register same as early as they can, but, as you know, it would be an impossibility for us to send a special letter to everybody. Thought possibly you might be willing to make a short notice and see that it was published in the periodical in which you are interested so that every owner may get some form of communication, either through your periodical or by mail.

We have the number plates in storage and we would like to register 25,000 cars in November, if possible, and if so, we will give much better service to every one who owns an auto and registers same.

Any publicity you can give this will be beneficial not only to our board, but to the automobilist as well.

Very respectfully yours,
JAMES W. SYNAN, Com.

National Highways—Good Roads Everywhere

Association Head Shows How They Will Do More Than Any One Thing for the Real Development and Defense of Our Country

By CHARLES H. DAVIS.*

How can the United States—48 of them—get good roads everywhere? One hundred million people want them. They have needed them 100 years or more. They have wanted them 50 years or more. Why have we grown into one of the great nations of the world, to be the only great nation without good roads everywhere? How did our more active and prosperous countries first get their good roads, such as they were? How did the few states that as yet have only made but a beginning get theirs? The answers will show us the way if we have the honesty and the truth to follow.

One thing is sure. No such platitudinous resolutions as were adopted by the Chamber of Commerce of the United States at Atlantic City, Sept. 24, 1917, will help much. They advocate no plan. They have no real force or purpose. In fact, there is but one plan that will attain our great objective—good roads everywhere—only one way—the way advocated by the National Highways Association and its founders. The only definite, concrete plan advanced from any source—the plan advocated from the beginning in the educational program of the association—is the plan expressed in the name of the association—national highways. This is the plan followed in other countries where they have attained good roads everywhere, and is likewise the method whereby a few good state highways have been attained by a very few of our 48 states.

Values for Military Uses.

Our nation is spending billions of our money in war preparation. Much that is going into emergency efforts will be thrown away. Very much less than our people are yet aware of is going into sound, lasting, permanent preparedness. A great military authority of national repute and patriotism has said:

"We could probably obtain adequate national defenses in 10 or 15 years, provided we seriously undertook and conscientiously carried through the work."

The same authority recently wrote the author the following (to quote and paraphrase):

"National highways will do more than any other one thing for real development and defense of our country."

And yet we have voted billions upon billions of money, of which practically nothing is for military or industrial roads. Such a policy—or lack of policy

—does not make for the confidence of our people. We are all for preparedness—real preparedness—for the defense of our dear country.

It is stated that 50,000 or more loaded cars are in transit that cannot be handled at our eastern, western and southern seaports. Loaded freight cars are standing on hundreds of miles of sidings within 200 or 300 miles of these terminals. These cars cannot be moved. Flour, grain, lumber, iron and steel are stopped in transit. Lack of cars and locomotives, inadequate harbor facilities, docks, lighters, vessels, terminals and tracks are all partly held responsible for the trouble. Shipments of freight, and even express, over distances of less than 100 miles, take weeks for their delivery.

This being true in time of peace within our home territory, although at war upon foreign soil, is it not obvious that in time of war within our own borders we would find ourselves absolutely without the needed transportation facilities? Such transportation preparedness is the rock upon which battles are won or lost.

The French in 1870-71 were defeated largely for that reason. Troops held for days where they are not supposed to be, without support or supplies and food, become mobs, and mobs cannot fight.

Battles cannot be successfully fought unless the machinery for men, horse, artillery, equipment, ammunition, supplies and food is on time like clock work. There can be no waiting, no delays, and promptness in execution depends primarily upon transportation.

Roads Worse Than Railways.

And how well equipped do we find our country in highway transportation facilities? Worse, far worse, than our railroads. And yet our highways should supplement our railroads as well as perform their natural functions. As a matter of fact to all intents and purposes we have not even begun to get good highways for peaceful, industrial uses. One can only travel a few miles over a good road before coming to many, many miles of poor roads, and more of utterly vile ones for many months in the year. Hardly a mile of even our so-called good roads could stand the constant intensive traffic of a military campaign. They have not been located or built with any thought of any such possible use. Most of them are not even wide enough for industrial uses, to say nothing of their construction.

We seem to go ahead with our eyes shut and our minds closed to what Europe has accomplished in highway building. Germany, even today in the midst of a life-and-death struggle with over-

whelming odds, is putting more effort into building military and industrial roads than into almost any other activity. Many of our so-called road officials are butchers, bakers or candlestick makers, quite incapable of doing what should be done even when told what was necessary.

Our system of roads could be made to help out our railroads both in times of peace and in times of war. There is, however, but one way to attain these results within any reasonable cost and time. Just as town or township roads were unable to properly serve the country, so country roads were found inadequate for state needs, and now we are seeing that state roads cannot serve the nation * * *

Many people in the small northeastern section of our country are antagonistic to the national government engaging in road building. This section comprises the six New England states and New York, New Jersey and Pennsylvania. Comparatively few people in the South, Southwest, Mississippi Valley states, Northwest, Rocky Mountain regions and the Pacific states, comprising the rest of the country, appreciate or understand this antagonistic point of view. This objection is not confined to a particular plan, but to any participation in such an undertaking by the national government. Of course all easterners are not opposed. The big, broad-minded, far-seeing men of vision know to the contrary. Also many people do not know the vital difference between so-called "Federal aid" and national highways. The former means gifts of moneys to the states to help build roads. Various plans for this are suggested, but they are all fundamentally unsound because of the "aid" or "gift" feature contained in all. This method relieves the Federal government of all responsibility and will inevitably result in "pork" and not in roads. National highways, on the other hand, limit the mileage and fix the responsibility where the people can see and judge of the honesty and efficiency of their public servants, and thus assures the money getting into roads.

If there is one section of the country more than another where the good roads movement has not gained a foremost place in the minds of people, it is the northeast corner, comprising New England and the Middle Atlantic states:

Maine	Rhode Island
New Hampshire	Connecticut
Vermont	New York
Massachusetts	New Jersey
	Pennsylvania

*An address by Charles Henry Davis, C. E., president National Highways Association, offered to those assembled at the meeting of the Southern Commercial Congress, Hotel Astor, New York City, Oct. 15, 16 and 17, 1917.

There are many reasons for this, the most important being the following:

New England Roads Improved.

The states above named are, as a group, the oldest and wealthiest in the Union. Their population is comparatively dense. Large and wealthy cities abound. Their roads, while not by any means approaching what they should be, are in general superior to those of the remainder of the country. Much more money has been available for their improvement than for those located in the newer, more sparsely settled, and, therefore, poorer states.

The percentage of improved roads in this northeastern corner is 14.47%. In the remainder of the country only 7.83% are improved, or relatively about half as great. This northeastern corner has 12.2% of the total mileage of all public roads, while the rest of the Union has 87.8%. On the other hand the East has little to be proud of. This seeming superiority is really not as great as should be expected. The population is 28% of the whole; the wealth, 30.4%; the area, only 5.4%. Surely the East has little to be proud of with such greater advantages. This is more clearly brought out by the following table:

COMPARATIVE TABLE.

Item	Whole U. S.	Northeastern Corner	Per Cent.
Population	91,972,266	25,868,573	28.0
Wealth	\$107,104,211,917	\$38,301,588,571	35.8
Improved roads (miles)...	190,476	38,868	20.2
Land area (square miles)...	2,973,890	161,976	5.4
Public roads (total miles)	2,199,646	268,534	12.2
Nat. highways (proposed)	50,485	5,143	10.1

Thus, it is shown that the central, western and southern states have made greater progress in road construction in relation to their wealth, population and area, and, therefore, ability, than the eastern states.

Analysis of Opposition.

But possibly the greatest factor which causes some eastern people to be relatively phlegmatic in regard to good roads, or possibly even antagonistic to them, is that this movement has now come to direct its attention very largely upon the national government participating in road construction. The reason is not hard to find. Among all the various plans which from time to time have been advanced, either for "Federal aid" to the states or for national highways, there are none which, upon casual inspection, appear to give the eastern states a fair share of the money or roads as the case may be. With most of the plans this criticism is quite just. On the other hand a system of national highways can be so designed and its financing so arranged that no such criticism will be justified.

When an easterner looks at a map of the United States upon which are drawn a number of lines, all of equal weight, representing a system of national highways, he is quite likely to say to himself, "the sparsely settled western states get most of the roads, whereas we of the thickly settled East will have to pay for them." Most likely he will not stop to think that the roads would not all be constructed of the same mate-

rials and be of the same width and thickness, thereby costing the same amount per mile to build * * *

One could cite examples without number, all proving the great truth that whatever benefits one portion of a nation benefits the whole nation. This must be admitted by all except those afflicted with an abnormal amount of sectional pride or greed. And in view of this fact it is believed that no one can offer any sound objection to the building of a comprehensive system of national highways—highways built, owned, maintained and controlled by the people of the whole nation as a unit, and, likewise, for the use and benefit of all the people, East, West, North and South.

The 39 states of the Union outside of this small northeastern section have 78 votes in the United States Senate to 18 representing the nine northeastern states. Some of these 18 are big enough and broad enough to know the untold value of such a system of national highways. These 39 states also have 312 votes in the House of Representatives, while the nine northeastern states have only 123 votes, some of which also know and understand the economic, financial, social and moral value of the national

highways as the only vehicle by which the nation can attain good roads everywhere.

Police Activities

Revere Beach Boulevard—The police are making arrests of violators of the speed laws on the Revere Beach Boulevard. The speed limit there is an arbitrary 20 mile limit.

Brookline—Owing to several serious motor vehicle accidents in this town the authorities have ordered the police to enforce the motor vehicle laws and traffic regulations. Motorists will be required to keep within a speed of 20 miles an hour and slow down and signal at intersecting ways.

RHODE ISLAND.

Providence—The police commissioners of this city are arranging a new traffic squad to devote its attention exclusively to overspeeding motorists. So that motorists better "have a care" in driving through this city. The speed limit is an arbitrary one, and to the District Court, before which these cases are brought, practically all violators look alike. The fine is seldom, if ever, less than \$15, plus costs.

Providence, R. I.—Do not leave motor vehicles unattended for more than five minutes in the business section of the city, nor more than 15 in other sections.

Tiverton, R. I.—The police are arresting motorists traveling faster than 15 miles in the thickly settled portions of this town.

TRAPS.

Halifax—Between Whitman and the entrance into Halifax it is open country: persons running over 25 miles an hour are being arrested.

MASSACHUSETTS.

Pittsfield, Mass.—The motorcycle police of this city are still active, especially along the Pittsfield-North Adams state highway.

Worcester, Camp Devens—Owing to several accidents and considerable careless driving of motor vehicles, the military authorities have placed a speed limit within the cantonment of 15 miles an hour, and this rule, as well as the traffic rules, which will be conspicuously posted, will be strictly enforced.

UNITED STATES HIGHWAYS.

An item of interest to New England motorists especially is gleaned from the recent report made by the office of Public Roads and Rural Engineering at Washington. It appears that at the close of 1916 there were 2,455,761 miles of rural roads in the country, of which 287,047 miles were surfaced in some way. In other words, only 11½ per cent. of the roads were other than dirt, which emphasizes the fact that the great road problem in the country for a number of years to come will be to secure the most economical and efficient improvement of dirt roads.

It also appears that of all the states Massachusetts has the greatest percentage of her roads surfaced, namely, 47.6 per cent. Indiana comes next with 42.5 per cent.; New Jersey with 40.5 per cent.; Ohio with 36.5 per cent.; Rhode Island with 34.5 per cent.; Kentucky with 23.2 per cent.; New York with 22.7 per cent.; Connecticut with 22 per cent., and California with 20.2 per cent.

And that almost \$273,000,000 was spent on the roads of the country during the year 1916.

RHODE ISLAND HIGHWAYS.

The great main highway between Providence and Narragansett Pier, known as the Narragansett Pier road, is undergoing material changes in the alignment and grades of the road and the elimination of two dangerous curves and a steep up grade over Barbour's Heights hill in the town of South Kingstown. Leaving the present highway near the Green farm, just below the village of Hamilton, the route extends in an almost straight line through the meadows and across a marsh to the foot of Barbour's Heights hill, where it rejoins the old highway. Instead of the short, abrupt grade, which since the state road was first built, has tested the hill climbing ability of motor vehicles, it is planned to have a gradual rise from a point close to the junction of the new layout and the old road at the Green farm, the filling in along the new route and the cutting away of the brow of Barbour's Heights hill. The section of the new way now under improvement is about one and a half miles in length and includes in addition to the new layout through the Green pasture land a considerable part of the old road on Barbour's Heights.

CONNECTICUT CASUALTIES.

The public authorities of Connecticut report fewer deaths from automobile accidents during the last five months of the fiscal year of 1917 than for the corresponding period in 1916. Ninety-five persons were killed in motor vehicles.



Driving Used Car Illusions Around a Circle



NINETY PER CENT. of the automobile owners who ought to be in the market for a new car drive their old car around until it is shabby and almost ready to fall apart. Most of them have been told that the depreciation on their machine was 50 per cent. the first year, 30 more per cent. the second year, the third year it is worth nothing and after that the car owes the junk dealer money every puff of breath it takes.

So they ride around in the old car another 1000 miles or so and put off the day when they should go around and buy the new car they are able to buy, entitled to have and are being buncoed out of by the operations of a peculiar superstition prevalent among car owners that what they have is good enough rather than to give the old machine away for a song.

They have been told so earnestly and so frequently that used cars are a glut on the market that they swallow the bait, hook, line and sinker, and do not even take the trouble to find out whether such assertions are really and truly so, or if they are simply the inventions of persons who put out this line of information without full knowledge, or with some special purposes to serve, and to whom the matter of knowledge or no knowledge on the subject is a matter of very great unimportance.

They may have been told further, that it is useless to try and get a fair value for the old car and that the best way to get their full value out of the vehicle is to ride it out. So they ride around another thousand miles or so and think they are lucky that the government, or some other high and mighty authority, don't come and take it away from them.

They may have been told that they better not go near Mr. Dealer's because he is pushing a certain new car very assiduously and will offer a trade if one doesn't watch out. They are told in this connection that there are certain cars on the market today that are made to sell to people who want a lot of money for their "old car;" that they can give a long trading price, but they certainly can't give much of a car in boot. And, strange as it may seem, there are a good many automobile owners afraid of a shadow like that. So they ride around in the old car another 1000 miles or so and they wonder why Mrs. Smith-Rox neglected to bow to them at church of a Sunday

morning. One illusion breeds another and the whole crop keeps motorists driving around in a circle, sometimes fast and sometimes slow, but always with small hope of either getting off at a tangent or making a short cut to the centre.

They have been told that somebody, association, individual or publication has a price chalked against their car according to the date on which it was turned out of the factory; that it is a price that wouldn't buy an old cheese on a rainy market day, and yet to all practical intents and purposes it might as well be chalked in figures a foot high on the side of the car body, for the people who have to do with these things believe that it is just about the proper ticket and because it is low enough that they need not take the trouble to appraise the machine for themselves and determine its exact mechanical worth and service possibilities.



First Class Marksmanship in the Used Car Department
Sends the New Car Gliding Across the Target.

Too many car owners have many illusions about this question. They have been told that in order to buy a new car they will have to brush up on their salesmanship. So they ride out another 1000 miles or so of the remaining service value in the car and clip another coupon from the \$500 bond that should have been in the hands of the dealer long ago, or its equivalent, and well on its way to the manufacturer. The illusion still holds the motorist that he has spent a good many hundreds of dollars on the car, kept it remarkably free from squeaks and rattles and has a machine that gives him the service he wants every time he calls on it for duty. He rides past the dealer's door a dozen times before he gets a glimpse of the new sign that has been hung out by the new service man. When

he does see it the words are just a blur and he has the illusion that it means nothing very different from the old one which he has the illusion that it read:

USED CARS KEEP OUT OF HERE.

So he rides around another 1000 miles or so under the impression that he is getting more service value out of his property than a set price schedule will admit is in any car of that make and model. About this time he is in the grip of a genuine illusion. For the new service man is wide awake to the fact that set prices are an illusion, that it is not possible to set a valuation on a used car by any rule of thumb ever made, and so his new sign reads:

BRING YOUR CAR IN; LET'S TALK IT OVER; EXPERT APPRAISEMENTS.

With light streaming in on the used car business to the effect that it is a real business and must be so conducted for the best interests of the owner, dealer and manufacturer, the days of driving around in a circle are numbered. The owner knows the worth of his car on the basis of mechanical condition and its remaining service value, the staple values of his property, and will so pass it on in the market where its appearance and service after overhaul maintains the car as a purchasable commodity.

There is one thing about a circle. The distance from circumference to centre is very short and the bull's eye of used car target is the square deal.

The rising tide of interest in what a car is worth after it has traveled several thousand miles, as well as the effect on production of war operations, is a progressive sign in motordom. It says that the traveling worth of a car is more important than the year of its design. After all the car's the thing.

SAXON COMPANY SELLS NOTES.

Through the sale of an issue of \$600,000 of 10-year six per cent. notes, the Saxon Motor Co. has been able to resume work on its plant in Detroit. The work was stopped several months ago when the company experienced financial difficulties. On Nov. 1 the company will pay a 10 per cent. installment on its debt to creditors; another of 10 per cent. on Feb. 1 and the remaining 80 per cent. by Aug. 1, 1918.

PLATE XII.

NEAT STUCCO GARAGE FOR ONE MOTOR CAR

Many Conveniences Planned in Compact Hip-Roof Structure,
Framed to Correspond in Finish With the Other Buildings

Designed by the Architectural Department of the Automobile Journal Publishing Co.

ON THE average private estate the owner's garage requirements call simply for a substantial building in which to house his motor car, although it must be of permanent type of construction and finished so that it will harmonize with the dwelling and not fail to harmonize with the place.

The stucco garage is admirable for such a location, being rugged and slightly in appearance and susceptible to almost any kind of finish that the owner chooses to make it match surrounding buildings. Such a building is shown in the plans in this issue and it is designed for housing one machine on a private estate. The principal feature is the stucco walls laid on metal lathes on which there are a number of kinds, some very rigid, making the structure stronger and more durable. The stucco is placed over the lathes in three coats. The first coat should be made of one part cement, three parts clean, well graded sand, 10 per cent. of the weight of the cement of hydrated lime and one-half pound of hair per 100 pounds of cement. Before this coat has set it should be scratched with some sharp instrument so that the second coat will adhere readily. The second coat should be applied before the first coat becomes dry and should be mixed the same as the first coat, except that only $2\frac{1}{2}$ parts of sand are used and no hair. Special care should be taken in laying this coat, as it forms the shape of the surface, the last coat being a finishing coat and one that is mixed with pigment if desired to match the color of the residence.

If it is desired to make the surface of the stucco correspond to that of the house, it can be brought out by treating the third coat before it sets. This surface finish may be made in several designs, by roughing it or giving it a splatter dash or pebble dash appearance. The stucco is also used to cover the underpinning.

The concrete walls, which extend below level $3\frac{1}{2}$ feet, are made of a mixture of concrete consisting of one part cement, two parts sand and five parts crushed or coarse stone. Before the cement hardens it is a good plan to place in position the bolts that are to be used in fastening the sills.

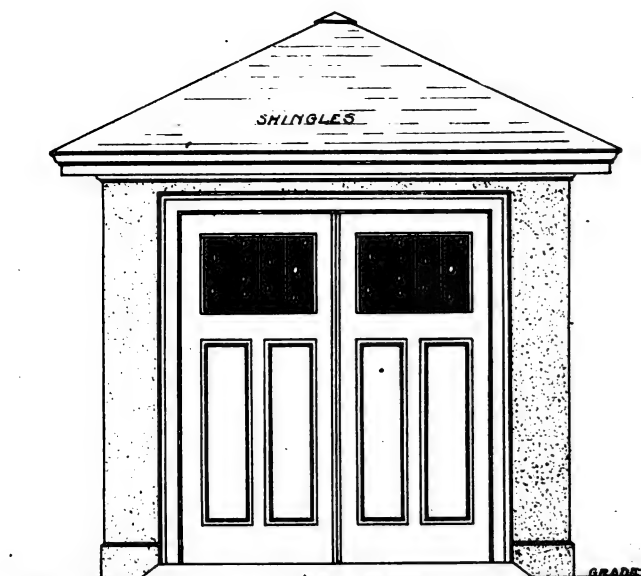
Drain and other outside connections should be provided for when the trenches for the founda-

tion are dug and it is also convenient to lay the floor at the same time as the foundation, as in this way all the concrete mixing can be done at the same time, greatly facilitating the work and economizing on labor. Two mixtures are used in the floor, the first layer, three inches thick of one part cement, two parts sand and five parts of crushed stone, and the surfacing layer, one inch thick of one part cement and two parts sand. The floor should have a slight pitch toward the centre to carry the water to the drain.

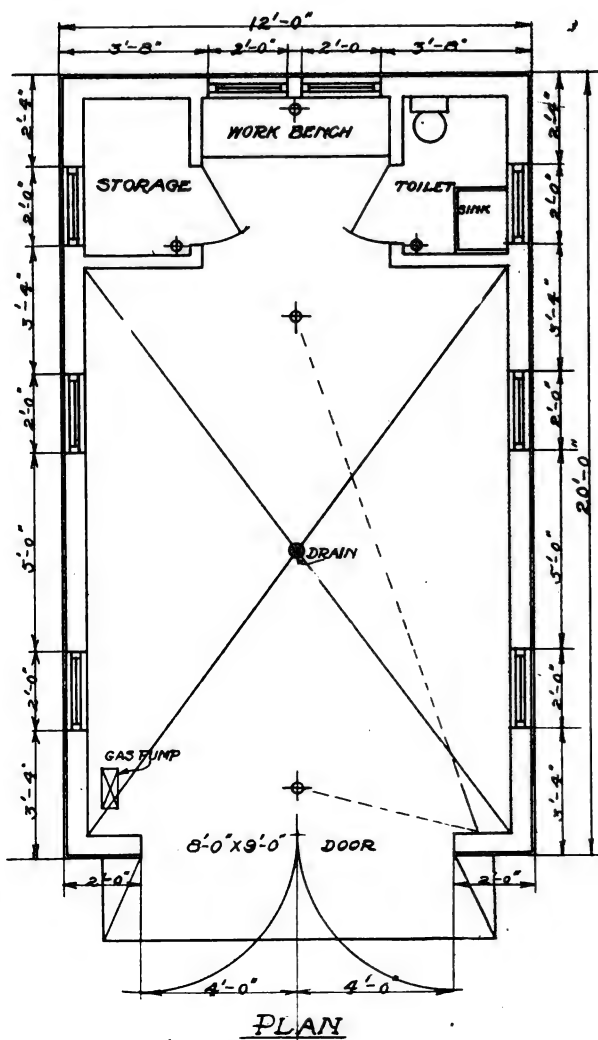
As shown in plan the building is framed on 4x4-inch sills with 2x4-inch studs; 2x6-inch spruce rafters and ceiling joists and the plates are made by nailing two 2x4-inch studs together. The inside is sheathed with North Carolina pine sheathing seven-eighths of an inch thick. The cornice should be made of white pine stock, including crown mold, fascia, plancier and bed mold. The roof is of the "Hip" type, made of hemlock boards laid two inches apart and nailed to the rafters. Extra cedar shingles laid $4\frac{1}{2}$ inches to the weather and nailed with galvanized nails. White pine stock is used for the saddle boards.

The doorway is eight feet wide, affording ample entrance room, and is closed with two swinging doors with windows in the upper halves to increase the light. A mullion window is located directly over the work bench and there are six other windows, located as shown, which can be either hung or hinged as desired. In addition to the toilet at the rear there is a small room for storing the various things that are needed in a garage, and it serves to keep the equipment in order and keep the interior neat and trim.

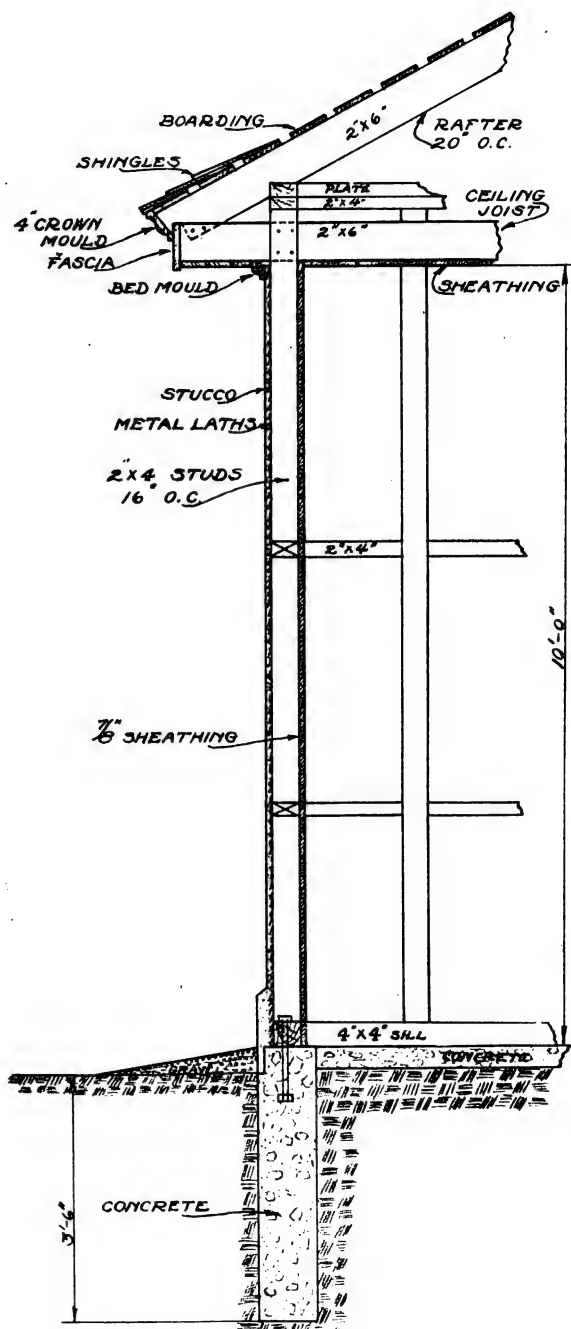
Much waste and dirt accumulates in a garage, particularly old casings, tubes and other things of sufficient value to be retained, and if a closet is provided for such articles, such as the one marked storage in this design, the interior of the building proper can be kept presentable. The cost of a garage of this type would be dependent to a considerable extent upon the ruling wages for labor and the accessibility of materials, but even if it were constructed of the very best of material and hardware the total outlay should not exceed \$800.



ELEVATION
SCALE



PLATEX



SECTION
SCALE



Accessories Department



CARSON KICKLESS CRANK.

The Carson kickless crank is a device to eliminate the danger from back firing when cranking an automobile engine. This device is sold under a forfeit of \$100, which may be collected from the manufacturers in case a person using the device is injured by the kick of the crank handle. The mechanism of the device is quite simple and it is claimed that there is practically nothing to break or get out of order. It can be attached by the most inexperienced motorist in a few minutes.

Manufactured by Carson Manufacturing Co. of Richmond, Va. Price, \$7.50.

THE HANDY TERMINAL.

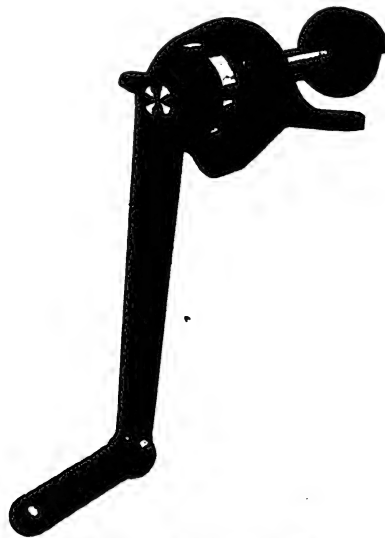
Every motorist at some time has had the aggravating experience of engine trouble, due to faulty ignition connections. For efficient engine action perfectly tight connections are necessary. The Handy Terminal is designed for practically any type of cable connection, and is connected without soldering. The ferrule is fitted to the cable and the stripped wire firmly held by a copper clip, which is claimed not to work loose. The jaws of the device are threaded on the inside and engage the threads of the battery or spark plug bolt. One motion raises the ring, compresses the steel spring, releases the terminal and lifts it from the bolt. There are no nuts to tighten or make loose, and its application takes but an instant.

Manufactured by the Francis-Rand Co., 400-401 Erie Bldg., Cleveland, O. Price, 25 cents each.

TWITCHELL GAUGES.

The perplexing problem of what to give the motoring friend as a Christmas present is made very easy of solution by the Twitchell Gauge Co. of Chicago, which has prepared a special holly and mistletoe box for use by dealers in "dressing up" the exterior of the container in which the gauge is ordinarily sold.

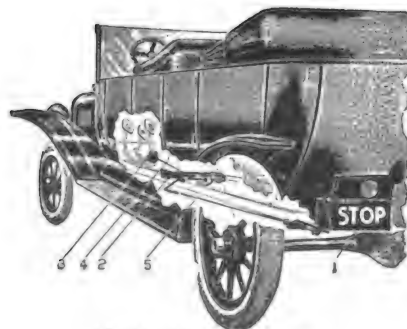
These decorative covers are furnished free to the trade and make a strong appeal when displayed on counters or in windows.



Carson Kickless Crank.



Application of the Handy Terminal.



Auto Signal Lamp.

AUTO SIGNAL LAMP.

A combination tail light and signal is illustrated that should be of interest to every automobile owner. It consists of a sheet iron box which is fitted with an electric bulb and a shutter. With the shutter closed a red light is visible from the rear. When the shutter is opened the letters STOP appear, white on a red background.

The shutter is operated by a rod, which is attached to the service brake pedal, thus relieving the operator from all worry. When the brake pedal is operated the shutter is opened.

Manufactured by Banner Accessory Manufacturing Co., 1314 South Seventh St., St. Louis, Mo. Retail price, \$4.

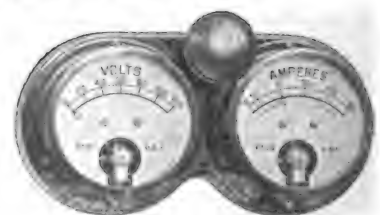
RADIATOR EMBLEMS.

The automobile of the veterinary, like that of the physician, often carries the sign of the profession, so that it may be identified to traffic officers and others who can help to expedite its progress. A radiator emblem, attached to either the filler cap of the radiator or to the radiator front, is a dignified means of identification. Such emblems may be obtained for practically any type of car, and in many designs of blue and green crosses, nickel plated or chased and gold.

Manufactured by the Art Metal Works, Newark, N. J. Write for illustrated catalogue and prices.

COMBINATION VOLT-AMMETER.

The General Electric Co. has developed a new, direct current, duplex instrument with self-contained attachment for illuminating the dials, which is particularly adapted to electric vehicles and other automobile direct current panel applications, such as are used for battery charging sets and lighting.



Combination Volt-Ammeter.

The device consists of an ammeter and a voltmeter mounted on a bakelite base, with outside dimensions of 5½ by 2½ inches and having a depth of 1½ inches. The D'Arsonval permanent magnet moving coil construction is used in both elements, the resistance for the voltmeter is self-contained, the ammeter requires an external shunt. The instruments are finished dull black and can be equipped with paper scale with black marking or with metal scale plate and white figures on black background. Voltmeter of standard capacities range from 10 to 150 volts and for the ammeter any desired capacity can be obtained, either for one way indication or double, showing charge and discharge readings. Terminals may be connected either from the back or from stud terminals as desired.

Manufactured by the General Electric Co., Schenectady, N. Y. Write for prices, giving full data of instruments required.

CECO VALVE ROTATOR.

Distorted valve stems, unevenly worn, and pitted valve faces are three engine evils that make for loss of power and unsatisfactory action. The Ceco valve rotator is an ingenious device, for automatically rotating the valves of an engine, a small portion of a revolution, so that at every up and down motion the valve is seated in a different location.

The device consists of three main parts, A which forms the outside of the rotating member, made of bronze and fastened to the engine cylinder; B, the rotating member which fits into A, and slides upon the valve stem against a small but sharply defined shoulder; and C, which is fastened or locked to the stem and carries a ball thrust bearing for permitting the valve to turn freely against the resisting action of the spring. B and C have ratchet like projections which prevent backlash. As the valve is lifted by the tappet the worm like fitting B is turned in the sleeve A, carrying with it the fitting C and turning the valve a small way. At the top of the lift, and at the beginning of the down stroke the fitting C is separated from B, allowing B to return to its original position without carrying C back. B is carried downward by the spring pressure acting through the shoulder of the valve stem.

It is said that valve action is not hampered in any way, nor is there any attendant noise due to the valve rotator. The device is made in a number of sizes to meet the requirements of the valve assembly of practically any engine.

Manufactured by Continental Engineering Corporation, Omaha, Neb. Write for prices and literature.



Ceco Valve Rotator Parts.



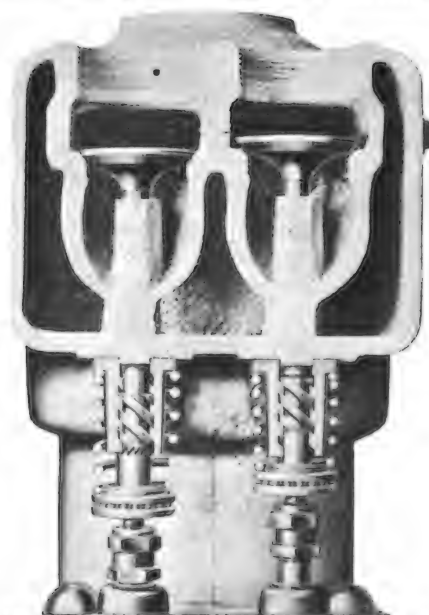
WALKER KE-LES LOCK.

The Walker Ke-Les lock is a device constructed on the combination principle, having no key of any kind. With the switch handle in the "OFF" position, both the gasoline and ignition is cut off, making it impossible to start the engine, yet complying with the law in some states which rules that an automobile must be left so that it may be moved in case of fire. To unlock the device, the correct combination must be used and it is said that there are more than 87,000 possible changes.

Manufactured by the Walker Ke-Les Lock Company, Chicago, Ill. Price \$10.

PIERCE GOVERNORS.

The delivery car owner, as well as the truck owner, is directly responsible for accidents caused by his vehicles, so that the limiting of car speed by means of



Application of Ceco Valve Rotator Parts.



The Pierce Governor.

governors is becoming common practise on these classes of machines.

The Pierce Governor is designed for practically any engine and driven by gears from the transmission. It is of the centrifugal type and so constructed that the opening of the centrifugal weights actuate a rack, which in turn opens or closes the butterfly valve located in the intake line. The device is compact in form and may be set to give practically any maximum speed. When once set it cannot be tampered with by the driver without the knowledge of the owner.

It is so arranged as to give maximum opening at low speeds and partially closed valve at and near the maximum speed for which it is set. The opening is entirely controlled by the car speed, so that plenty of opening may be obtained for heavy running. The device is a practical insurance against overspeeding and a full check against careless driving.

Manufactured by Pierce Governor Co., Anderson, Ind. Write for prices and catalogue.

BLOOD'S NON-FREEZE LIQUID.

With the arrival of winter comes the attendant danger of the freezing of the cooling liquid in the radiator and engine jackets. If the car is used during the winter a non-freezing solution is essential. The Blood's non-freeze liquid is used without water and has a freezing point at 58 degrees below zero Fahrenheit. The manufacturers claim that this liquid is superior to alcohol because of the fact that while alcohol solutions boil away and lose their strength under ordinary engine temperatures, this solution boils at 374 degrees Fahrenheit, far above that of water, which is but 212.

It is claimed that this solution has no action on metals, cloth or rubber; that it contains no calcium chloride or other inorganic salts, and that after the radiator is once filled no further attention is necessary.

Manufactured by T. L. Blood & Co., St. Paul, Minn. Price \$1.50 per gallon. Special proposition to dealers.

A-B AUTO-EYES.

A unique headlight is being put on the market under the name of A-B Auto-Eyes. This device is so arranged that when an electric button, which may be located near the driver, is pressed, the headlights are tilted forward; continued pressure upon the button bringing them back to horizontal position.

The equipment consists of two headlights with the necessary connections and wiring. In the right headlight case

is located a small specially designed motor, which is fitted with an arm and eccentric, which tilts the lamps as the motor is brought into action. The left lamp is actuated by the same motor, as the two lamps are connected by a coupling.

Manufactured by the Adams-Bagnall Electric Co., Cleveland, O. Write for prices.

UTILITY PROTECTED HEATER.

With the coming of winter, the motorist begins to consider heating devices. The comfort of riding is enjoyed only if the occupants are kept warm. To utilize the exhaust gases for heating the car, the Utility heater has been designed. This device may be fitted to any type of car either open or closed and requires but little work for fitting. The heating unit is connected through a flexible tube to the exhaust line, between the engine and muffler, and is so arranged that it may be opened or closed. This is accomplished by a regulating valve attachment, which may be opened; allowing all of the hot air to pass to the heater for cold weather; or closed cutting off the hot air entirely.

The heating unit is enclosed by a perforated metal protector so that there is no danger of burning the shoes or clothing. It is said to be noiseless and odorless, and that it causes no back pressure on the engine.

Manufactured by Hill Pump Valve Company, Chicago, Ill. Prices; large size \$15, junior size \$7.50.

SEE-SAFE WINDSHIELD WIPER.

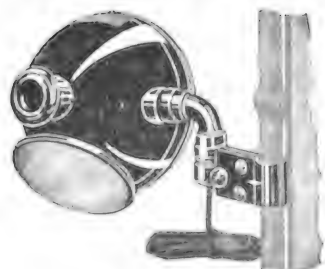
An extremely low priced windshield wiper and cleaner is introduced under the name of "See-Safe." This device is so arranged that it may be drawn across the windshield, cleaning a rectangular space, or pivoted upon the top and swung in a half circle.

Every driver who has driven in a rain or snow storm and been forced to put his head out past the windshield in order to see the road ahead, realizes the value of a device for keeping the windshield clear.

Manufactured by Stader Metal Specialty Co., 19 S. Fifth Ave., Chicago, Ill.

TWO NEW HOWE SPOTLIGHTS.

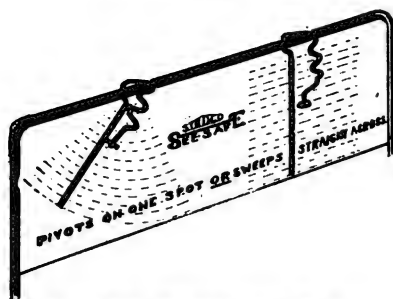
Two popular priced spotlight models, embodying the famous patented Howe principles, have been added to the Howe line. The No. 5 models of the double shell type, torpedo shaped, with baked on enamel finish. It is fitted with a four-



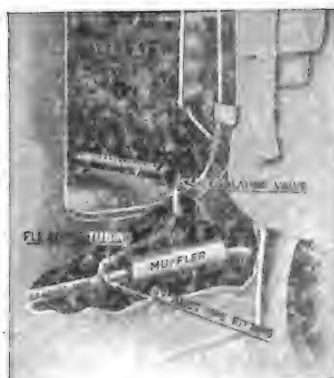
Howe Spotlight No. 5.



THORWALD'S ELECTRIC Carburetor Heater



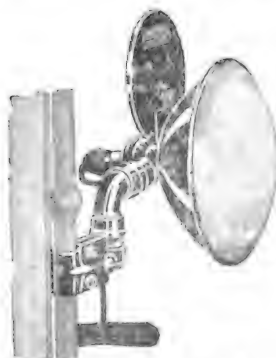
See-Safe Windshield Wiper.



How UTILITY PROTECTED HEATER Is Attached to the Exhaust



Badger Cut Out Parts.



Howe Junior Spotlight No. 15.

inch rear view mirror, an on-and-off switch in the handle, and the patented spring controlled Howe bracket, which permits instant turning at practically any angle, the spring holding the lamp firmly in any position. With this type, as with all models, clamps are furnished in seven styles to fit each and every windshield frame.

The light measures six inches across the face and with this exception is practically the same type as the old model nine.

The Howe Junior No. 15 is a single shell spotlight of very sturdy construction. It is fitted with a convex lens, four-inch rear view mirror, an on-and-off connector switch and the standard spring bracket. It is finished in baked on enamel and is very attractive in design.

Manufactured by the Howe Manufacturing Co., 1732 S. Michigan Ave., Chicago, Ill. Price for No. 5, \$5.50; Howe Junior No. 15, \$4.

THORWALD'S ELECTRIC HEATER.

The proper application of heat to the carburetor or intake manifold is said to be the easiest solution of the "hard starting" engine problem, which will probably be greater this winter than ever before because of the lower grade of fuel. The Thorwald's Electric Carburetor Heater is designed to vaporize the gasoline in the carburetor, even on the coldest day, and furnish an explosive mixture under any conditions. The manufacturers say that but little battery current is required to heat the gasoline in the carburetor to the boiling point, after which the motor may be started very easily.

The device is connected in circuit with a switch and the storage battery and with the switch thrown in furnishes the necessary heat for vaporizing the gasoline. It is claimed that by the use of this device much of the strain of difficult starting and continued use of the starting motor is removed.

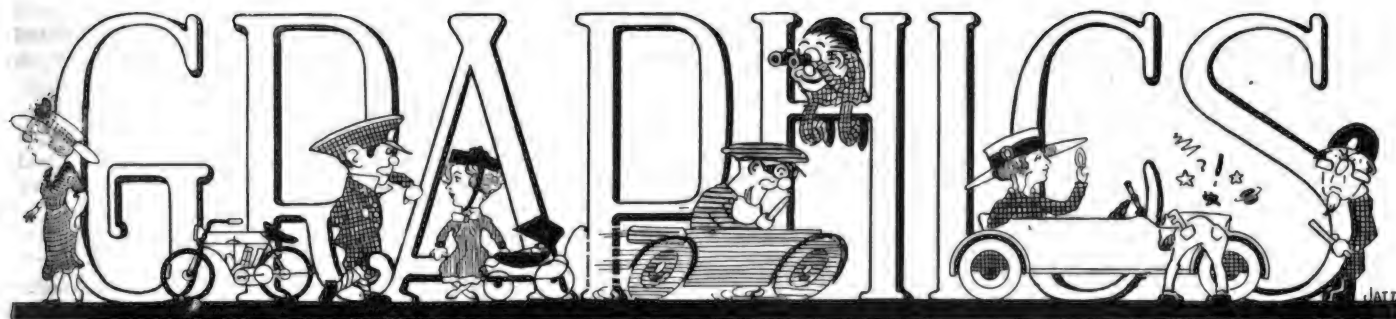
Manufactured by E. H. Sprague Mfg. Co., 606 S. 14th St., Omaha, Neb. Write for prices, giving name of car and equipment.

BADGER CUT OUT.

A new muffler cut out is now on the market which is designed for use on the Chevrolet 4-90, a car that is not equipped with a cut out at the factory. This outfit is known as the "Badger" and is easily attached to the machine. It is only necessary to cut a V section from the exhaust pipe, directly in front of the muffler, and then clamp the cut out over the opening.

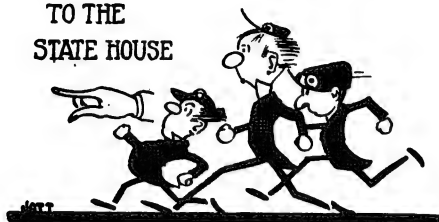
The manufacturers claim this is a quality proposition and that it is designed to give service and satisfaction. The valve is made of the best grade of iron, accurately machined and has a leak-proof feature, which is exclusive with this valve.

Manufactured by the Auto Parts Manufacturing Co., 313 Milwaukee St., Milwaukee, Wis. Price upon request.



Massachusetts motorists stampeded for the State Capitol in Boston when they heard of the order promulgated by the Highway Commission to the effect that there will be no "days of grace" after the first of the year in which they can drive their cars unmolested with the

TO THE STATE HOUSE



1917 numbers attached, but must have 1918 plates or be liable to arrest. The commission has the new plates on hand and believes it has given ample notice so that motorists can comply with the law.

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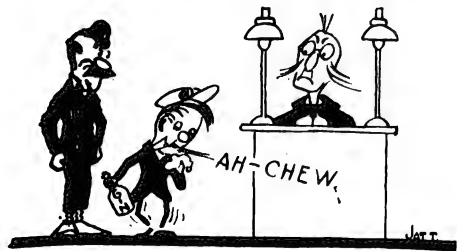
Down in New Jersey it will soon become commonplace to inquire if the grocery store has arrived. As paradoxically as such an inquiry might seem, it will be a perfectly proper one as soon as the new corporation organized there gets its fleet of grocery stores in operation. These stores will be mounted on gasoline propelled vehicles and will carry a full line of groceries and other things that are found on the shelves of the corner grocery. They will be driven through the suburbs, taking orders and delivering them immediately.

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The world's rubber production for this year is placed by conservative authorities at 250,000 tons, which is about double the production at the beginning of the war. About 60 per cent. of this is used in the United States.

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Automobilists when apprehended for



driving while intoxicated contrive many novel excuses for their condition, to minimize if possible the penalty that is invariably meted out to them. A judge in one of the Massachusetts courts recently listened to a good one, but apparently

had little faith in the prisoner's veracity, as he imposed a fine of \$75 and costs, after the defendant explained between coughs that he took the gin, which was responsible for his condition, as a cure for asthma.

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This is certainly getting to be a "motor age," as the Western Canadian Motorist observes, when Indian berry pickers, who formerly considered themselves lucky to be able to own a cow pony, now ride to their work in automobiles. In the Kamloops district a number of natives own motor cars.

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The food conservation movement has been productive of much good to both growers and consumers, as since its inception thousands of motorists have gone into the country and purchased their vegetables and fruits direct from the producers and brought them home, saving the middleman's profits, and at the same time getting fresh produce. Many motorcyclists having side cars on their machines also availed themselves



of the opportunity, and it was a common sight on many roads in the early fall to see one speeding along the road, homeward bound with a supply of produce for canning.

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Under the new conditions brought on the motor industry by the war one can no longer maintain his social prestige or position by sporting a new car each year with all the latest fixings. There will not be enough cars to go around by January, prices will be higher and many motorists will be glad of the opportunity to use their old buses without shame, regardless of their appearance. The repair and paint shops should experience a rush of business this winter and spring grooming up old cars for those who insist that their vehicle always look as spic and span as it did the day they bought it.

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With women rapidly forging their way to the front in politics and business, there is no good reason why they should not make good saleswomen, as they are

gifted with the conversational art and handle it in a convincing manner, as any husband will testify. They are also very enthusiastic about anything they take up, and for this reason one Boston distributor placed a young lady on his sales staff and she proved successful from the



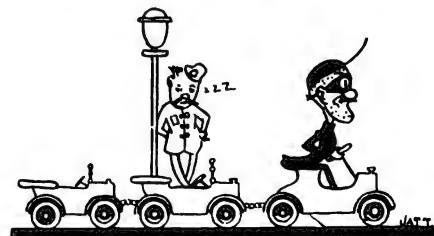
start. No better proof of qualifications for the position is found than her own description of her experience. She says: "There is more pleasure in driving a motor car than in doing anything else. It's not only wonderful sport, but it is the healthiest recreation for any woman. I always believed that I could sell motor cars and after making a trip in a touring car from Syracuse to Boston, a distance of 370 miles, in less than 17 hours, I raved so much about the car that I could not resist the 'something' which makes a person want to go and sell."

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Tammany won the sweepstakes in New York's mayoralty election hands down, so the little old metropolis ought to be some burg for the rest of the war, or after the war, as the case may be.

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Down in New York the theft of automobiles is becoming so common the officials fear that it will soon be looked upon by many the same as the umbrella borrowing habit, and that men who find their own machines have been taken will jump into the nearest one handy and drive it off. In the first nine months of the present year over 2000 machines



were stolen in New York and the police commission seriously proposed that a law should be enacted providing for the arrest of persons who were so careless as to have their machines stolen. This is probably the only remedy, as the cops seem powerless now to catch the thieves.

Jordan Forecasts Car Shortage

Edward S. Jordan, president of the Jordan Motor Car Co. of Cleveland, O., in making his annual report to stockholders gave some interesting facts bearing on the outlook in the motor car industry.

"There has been no over-production of good cars this year, and at present there is a big shortage of enclosed cars.

"The masses will be very prosperous this year. Ford could easily sell a million cars. The saturation point in motor cars will be reached when everybody has one, and when no car ever wears out.

"Once a man has accustomed himself to carrying on his business with the aid of the telephone and the motor car, he can as well afford to be without one as without the other. Just as long as there is a woman, wearied by family cares, who has come to know the convenience of a motor car, there is a potential prospect waiting.

"There are approximately 1,000,000 possible purchasers of Fords; 300,000 possible purchasers of cars below \$1000, excepting Fords, and possibly 50,000 between \$1500 and \$2500. Under the influence of increased list prices and taxation the number of cars in certain price fields may be reduced, but the aggregate sales seem to be increasing.

"There were 191,724 more cars and trucks sold during the first six months of this year than in the same period last year, and shipments of all cars in the last quarter exceeded by 2000 car loads the shipments of the corresponding month one year ago."

The Jordan company placed its first cars in the market in September, 1916, and during its first fiscal year sold 1788 cars at a valuation of \$3,189,600 on a working capital of \$300,000. The company is adhering to the policy of building only 2000 cars annually.

SILCO GREASE.

The fundamental principle of efficient lubrication is the practical application of a lubricant scientifically compounded. In a transmission or differential, not only must the fundamental principle be adhered to, but the lubricant must possess a certain quality of body so that it will both lubricate and cling to the gear teeth at the point of pressure.

It is said that Silco transmission and differential grease has all the qualities necessary for this class of lubrication. It maintains its consistency under all conditions, and at different temperatures. This lubricant is made from a base of super refined steam oil, which is said to be the best gear lubricant base known.

In addition to the regular line of transmission and differential grease, the manufacturers produce a cup grease which they claim will not drip or run from the bearings, which is also made from super refined oil base; a compounded graphite

grease for lubricating brakes, circulating pumps, steering gears and wherever graphite grease is required; and a spring lubricant which is unaffected by water or temperature and guaranteed not to run from the springs.

The manufacturers, International Lubricants Co., have a factory at Medford, Mass., with branch offices at 75 State street, Boston, Mass., and at 51 East 42nd street, New York, N. Y. Dealers or users of lubricants of high quality are invited to write for particulars relative to the Silco line.

COMMONWEALTH FINANCE CORPORATION EXPANDS.

The Commonwealth Finance Corporation of New York City has leased additional space in the 20th floor of the American Surety building, 100 Broadway, to care for the constantly growing

volume of its business. The company has also opened an office at 323-4 Bulletin building, Philadelphia, Pa., under the management of L. M. Selver. It is the largest capitalized financial institution in the country specializing in automobile paper.

SEE THE TRADE OUTLET.

Davis 'the Hardware Man, at the corner of Portland and Sudbury streets, Boston, Mass., is making an extremely attractive offer, which should prove of interest to the motorist at this time of the year, because of the possibilities of winter driving.

Davis is selling a limited number of the well known Type E 20 Gray & Davis Spot Lights for only \$1.98, and though the offer holds good only until Nov. 25, doubtless many of our readers will be glad to take advantage of this opportunity to increase the car equipment at a minimum cost. In addition to this bargain Davis is making a special proposition to dealers.

COMING EVENTS

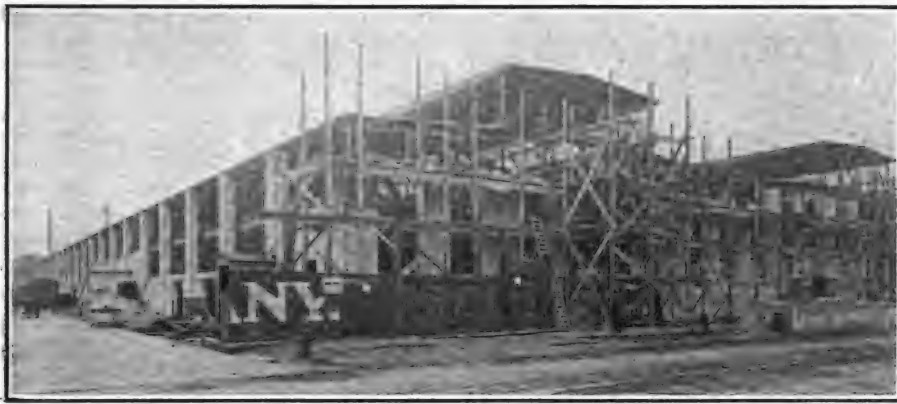
SHOWS.

Denver, Col., automobile and accessories show.....	Nov. 12-18
Akron, O., automobile show....	Dec. 3-8
New York, automobile salon, Hotel Astor.....	Jan. 2-9
New York, 18th annual automobile show.....	Jan. 5-12
Washington, D. C., carnival and open house week.....	Jan. 11-18
Providence, R. I., automobile show.....	Jan. 11-19
Philadelphia, 17th annual automobile show.....	Jan. 11-19
Milwaukee, Wis., automobile show....	Jan. 18-24
Montreal, Can., automobile show.....	Jan. 19-26
Cleveland, O., 17th annual automobile show.....	Jan. 19-27
Scranton, Pa., automobile show Jan. 21-26	
York, Pa., automobile show..	Jan. 21-26
Portland, Ore., automobile show.....	Jan. 21-26
Mifflintown, Pa., automobile show.....	Jan. 22-26
Allentown, Pa., automobile show.....	Jan. 23-28
Chicago, Ill., national automobile show.....	Jan. 26-Feb. 2
Chicago, Ill., salon, Congress hotel..	Jan. 26-Feb. 2
Harrisburg, Pa., automobile show....	Jan. 26-Feb. 2
Manchester, N. H., academy Jan. 28-Feb. 2	
Minneapolis, Minn., automobile show.....	Feb. 2-9
Kansas City, Mo., automobile show.....	Feb. 9-16

Kansas City, Mo., third annual tractor show.....	Feb. 11-16
St. Louis, Mo., automobile show Feb. 11-16	
Newark, N. J., automobile show.....	Feb. 16-23
San Francisco, second annual automobile show.....	Feb. 16-24
Waterbury, Conn., automobile show..	Feb. 18-23
Des Moines, Ia., automobile show.....	Feb. 18-23
Syracuse, N. Y., automobile show....	Feb. 18-23
Grand Rapids, Mich., automobile show.....	Feb. 18-23
Springfield, O., automobile show.....	Feb. 18-23
Pittsfield, Mass., automobile show....	Feb. 18-23
South Bethlehem, Pa., car and truck show.....	Feb. 18-27
Brooklyn, N. Y., motor vehicle show..	Feb. 22-March 9
Omaha, Neb., automobile show.....	Feb. 23-March 2
Boston, Mass., Boston Automobile Dealers' Association show.....	March 2-9
Trenton, N. J., automobile show.....	March 20-23
Stockton, Cal., automobile show.....	April 9-13

MEETINGS.

New York, Automobile Electrical Association.....	Jan. 3-4
New York, Society of Automotive Engineers, annual.....	Jan. 9-10
New York, National Association of Accessory Jobbers.....	Jan. 11-16



New Factory Addition Which Will Give Michigan Copper and Brass Rolling Mills, Detroit, Mich., Production Capacity of 1,000,000 Pounds of Thin Brass and Copper Per Month.

SHELDON PARTS IN NEW YORK.

The Chadick-Delamater Corporation has been appointed as representatives of the Sheldon Axle and Spring Co. for the distribution of parts in New York City and vicinity. The company's service station is at 159 West 24th street, New York City, and is well equipped to take care of repairs. A complete stock of parts will be carried for the purpose of cooperating with dealers and truck users, enabling them to make replacements on short notice.

BOSTON FIRM SELLING ACCESSORIES BY MAIL.

One of the oldest firms doing a large business in hardware and automobile accessories is the Davis Hardware Co. of Boston, Mass. For the past 45 years they have been conducting the same store, enlarging the area from time to time, until at the present time practically the entire building is used to carry on the great volume of business. Their motto, "If it's worth having—we have it," has been persistently advertised and lived up to, and their slogan of "Save the difference," has reached many of the cities and towns in New England.

Their store is a Goodyear service station, as well as the mecca for the retailing of a great number of the standard lines of automobile accessories.

OMAHA TRADE HOLDS MEETING.

At the annual meeting of the Omaha Automobile Trade Association, Inc., the board of directors was elected and dates for the 13th annual Omaha show set for the week of Feb. 25-March 2 inclusive. J. T. Stewart, Guy L. Smith, Lee Huff, E. R. Wilson and Clark G. Powell were elected directors and at a subsequent meeting elected the following officers: President, J. T. Stewart; second vice president, Guy L. Smith; secretary-treasurer, Clarke G. Powell.

KENT MOTORS MEN GUILTY.

Frederick H. Clarke, Henry F. Clarke, Fred J. Nagle and John A. Simpson were found guilty of using the mails to de-

fraud in floating the stock of the Kent Motors Corporation, a Delaware corporation, with an authorized capital of \$2,000,000. The verdict was handed down by a jury in the United States District Court at Trenton, N. J., and leniency was recommended for Henry F. Clarke, treasurer of the company, and John A. Simpson, one of the stock salesmen. All defendants were acquitted on the charge of conspiring to defraud.

Carwen Balancing Machine Disclosed

THE Carlson-Wenstrom Co., Erie avenue, at Richmond street, Philadelphia, Pa., builds commercially the Carwen dynamic balancing machine, which will quickly measure the correction necessary to obtain true running balance in automobile, aeroplane and marine engine crankshafts, electric motor and dynamo armatures, steam turbine rotors, centrifugal pumps, laundry dyers, cutter heads, high speed clutches and other parts of machinery where truth of balance is imperative to prevent vibration and the accompanying stresses.

Where the tests are of a series of parts, which may be stated as repetition, 100 automobile crankshafts, or objects of similar size, may be handled in an eight-hour day. Statement is made that the entire process of setting in the machine, measuring the degree of unbalance, and reading the chart, takes less than five minutes for an automobile crankshaft, and the result is better than is possible with hours of careful trial by expert workers.

The machine in general appearance somewhat resembles a lathe, having a bed designed to take parts of variable length and diameter that is mounted on two box pedestals. In finding the correction the position of greatest vibration is found and this is neutralized by adjustments, at which points the readings are made.

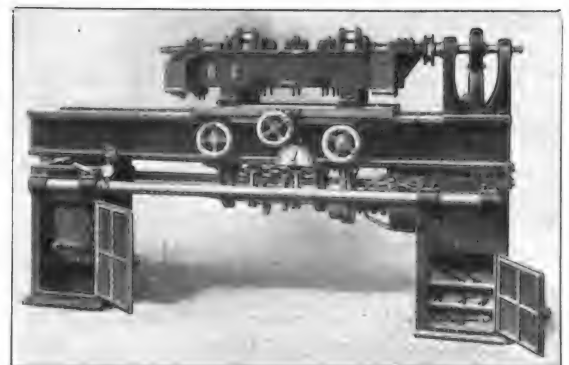
Brass Rolling Mill Make Big Expansion

THE Michigan Copper and Brass Rolling Mills, Detroit, Mich., is erecting an addition to its plant that will complete a unit of 1000x160 feet in floor space. The addition is of brick and steel construction and will be completed about Dec. 15. Upon the completion of the new addition the company expects to increase production to 1,000,000 pounds of thin brass and copper per month. The plant will be equipped with machinery of improved type provided with every device for the protection of the employees. A laboratory for research work in testing and chemical analysis is also being installed at the plant. The company is also establishing a doctor's office and emergency hospital, a welfare department and lunch rooms.

The machine illustrated will take work up to 20 inches diameter and 56 inches length and the working space required is eight by 3½ feet. It is especially suited to balancing engine crankshafts. Nine sizes are built at present, the range of these being from armatures for miniature motors to armatures weighing 14,000 pounds.

TORBENSEN FACTORY OPENED.

The Torbensen Axle Co.'s new building for the manufacture of three and five-ton front and rear truck axles, has been completed and the event was observed at the plant with an entertainment in the new structure, which was attended by 300 of the employees and their friends. Refreshments were served followed by dancing, and the affair proved very successful.



The Carwen Dynamic Balancing Machine, Suited for Correcting Balance of Engine Crankshafts.

Seiberling Wins Patent Suit

Miniature Tire-Making Factory Set Up In the Court Room Where Case Is Decided

THE United States Circuit Court of Appeals, Cincinnati, O., has handed down a decision validating the Seiberling Stevens tire machine patents and dismissing the appeal of the Firestone Tire and Rubber Co. from a decision rendered in a lower court, which alleged that the latter corporation, the defendant in the case, had infringed the patents.

It was one of the most important decisions ever given in relation to the industry, as it affects patents Nos. 725,135 and 726,561, under which many tire manufacturers are licensed. Some of the most eminent legal talent in the country were engaged on the case and the Good-year interest, of which F. A. Seiberling is head, set up tire making machines in the court and had them operating for the benefit of the court. The defendants also installed tire making machines in the court and operated them, so that the court room appeared like a miniature tire factory during the trial.

Unless the Firestone company procures additional evidence or points on which to take an appeal, the decision means the practical final adjudication of the patents.

COLUMBUS VARNISH CIRCULAR.

The Columbus Varnish Co., Columbus, O., has issued its latest semi-annual trade circular covering its Peerless automobile specialties, which include top dressings, enamels, polishing waxes, polishes, tire paints, rim paints, shellacs, anti-freeze fluids and carbon remover. In addition to graphic descriptions of the use of the various Peerless specialties, the circular gives the names of jobbers and manufacturers who indorse the company's products. These indorsements are from some of the best known people in the trade. The circular will be sent to any jobber, dealer or garage man who writes for one.

WALDEN-WORCESTER WRENCHES.

Every repair man or garage doing general repair work requires a great variety of wrenches. In every car there are nuts and bolts in inaccessible places where only socket wrenches can be used. For this purpose Walden-Worcester, Inc., of Worcester, Mass., have made up a set which they designate as No. 30, consisting of 30 wrenches of various types and sizes.

Some of the 30 wrenches have more than one sized socket, so that the total number of actual wrenches is 39, consisting of the following: 13 sizes of offsets, 10 speed wrenches, six L wrenches, five specially designed wrenches, three demountable rim wrenches and two tee handles.



Garage Service Wrench Set, Made by Walden-Worcester, Inc., Worcester, Mass.

There are no two of the same size of wrench from the same type of handle, all wrenches being chosen to fit the popular makes of automobiles, including such places where a specially designed wrench is necessary.

The full set, which should be of interest to every garage man who is planning automobile overhauling business for the winter months, sells for but \$20.

JACKSON'S MIDNIGHT TRIP INTO WHITE MOUNTAINS.

Guests at the Mt. Washington Hotel, in the White Mountains, received an agreeable surprise one October Sunday when they found the Boston Sunday papers at the breakfast table, as usually they are obliged to wait until 1 o'clock in the afternoon to receive the news.

A. H. Sowers, the New England dis-

tributor of the Jackson car, carried out the surprise for the hotel's guests, driving one of his new 1918 models from Boston to Mt. Washington, a distance of 170 miles, through rain and fog in about six hours. He left Boston shortly before 2 o'clock in the morning after visiting the various newspaper offices and procuring a liberal supply of Sunday papers. On the return trip the speedometer indicated nearly 400 miles, which had been covered on an average gasoline consumption of 17 miles to the gallon.

GOLD BOND GUARANTEE OF TORBENSEN AXLE.

The Torbensen Axle Co., Cleveland, O., has issued a neat little booklet entitled, "The Gold Bond Guarantee of Torbensen Internal Gear Truck Drive," which explains the Torbensen axle and the guarantee that goes with it. The company guarantees for the life of the truck, while it is in its original owner's hands, the I beam and spindles in the Torbensen axle against breakage unless caused by accident, and guarantees the internal gears against breakage or undue wear for a period of two years from the time the bond is dated.

TRADING WITH THE ENEMY RULES.

The Federal Trade Commission of the government has issued a pamphlet of instructions, rules and forms, concerning patents, trade marks, prints, labels and copyrights, as provided for in section 10 of the "trading with the enemy act," which was approved by Congress on Oct. 6 of the present year. The booklet explains the status of patents held in this country by alien enemies and conditions under which they may be utilized during the period of the war.

MOTOR 'BUSES RUN TO GRANT CANTONMENT.

A line of motor 'buses has been placed in operation between Chicago and Camp Grant, the national cantonment for that district, near Rockford, Ill. The 'buses are operated by the City Motor Transit Co. and seat 22 passengers.



A. H. Sowers, New England Distributor of the Jackson Car, Driving the New Eight on Top of Mt. Washington, After All Night Drive in Storm from Boston.

The New Allen Forty-One Series Disclosed

THE new Allen 41 series just brought out has the same wheelbase as last year, 112 inches, but mechanically incorporates more individual new features than is found in any of the new models of the old established cars. A heavier crankshaft, longer connecting rods, disc clutch in place of cone and new engine equipment and control unit, are the changes noted in the power plant and the flexibility of the engine has been greatly increased, permitting a speed range of from two to 50 miles an hour without "loading up" at slow speed under a heavy load or overheating at high speeds.

The new clutch is a Borg & Beck 10-inch single dry disc. An Allen transmis-

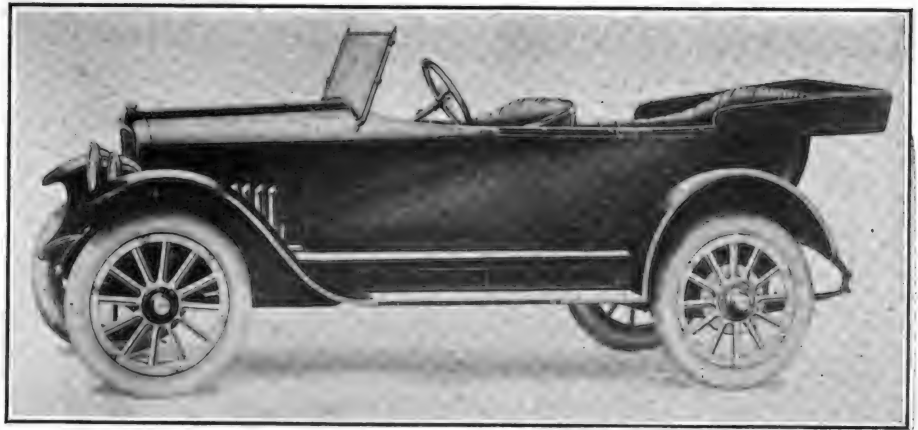


Looking Along the Straight Line Above the Fender in New Allen Car.

sion issued with a gear ratio of 45/11 to 1 for high; 14.25 to 1 for low. The intake and exhaust manifolds, spark plugs, valve adjustments, oil pump, oil filler, Stromberg carburetor, carburetor intake furnace, primer cups and practically all other parts of the motor equipment are on the same side of the engine, facilitating adjustment and attention. The Stewart vacuum fuel feed system is used with sight gauge.

Changes are also found in the electrical system of the new Allen, the control for the starting, lighting, ignition and Garford motor driven horn being in unit in the Connecticut rotary master switch, which is mounted just below the wheel on the steering column and fitted with a Yale lock. Only carburetor choke, speedometer, ammeter, Connecticut automatic ignition circuit breaker and dash light are mounted on the dash.

The new radiator is a Perfex honeycomb type and the thermo syphon system of cooling is used. Both force feed and splash system of oiling is used. There are also many improvements



Popular Model of Allen Series 41, Showing Handsome Streamline Body; Wheelbase, 112 Inches; Priced \$1095.

which greatly enhance both the appearance and riding qualities of the bodies. They are roomy, low hung and upholstered with the best of material. The springs are of the double deck type, taking up the ordinary shocks on the first tier and the more violent jolts on the second, the whole cushioning what little jar is transmitted through the 55-inch rear semi-elliptic springs.

The bodies are a good example of the coach builder's art, being finely finished and of pure stream line design, featuring a straight line from the level of the front fender top to the rear door grip. The bow sockets are enclosed in a dust boot and there is a splash guard in front below the radiator.

There are three body styles on the 41 Allen chassis, the five-passenger touring, the four-passenger roadster and the five-passenger sedan selling at \$1095, \$1095 and \$1395 respectively f. o. b. Fostoria, O.

REPUBLIC RUBBER WILL TAKE OVER KNIGHT.

The Republic Rubber Co., Youngstown, O., has completed plans for increasing production, which will include taking over the Knight Tire and Rubber Co. of Canton, O.

The plan will be carried out through the formation of the Republic Rubber Corporation, with a capital of \$10,000,000 preferred stock and 250,000 shares of common stock of no par value, which

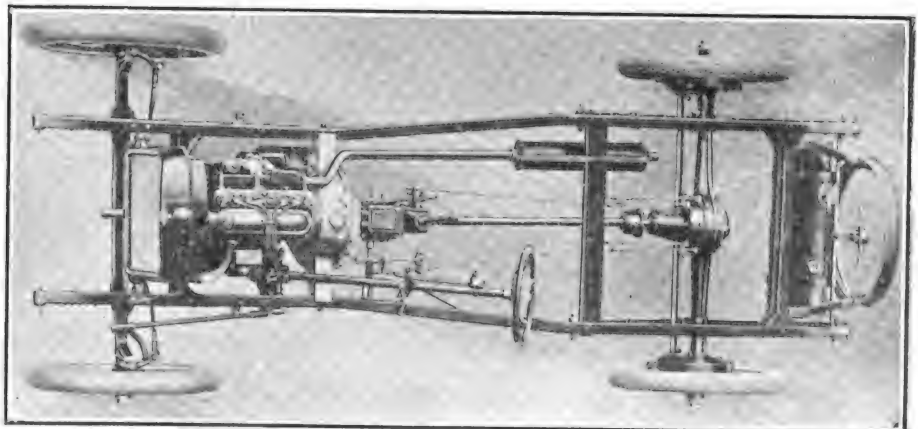
company will absorb both the Republic and Knight companies. The stock has all been underwritten and the new capital available for carrying out the expansion of manufacturing facilities in order to increase production on the products of both companies.

Manufacturing operations will be continued at the Canton plant, where Knight and Blackstone tires will be the principal product, but the principal expansion in production will affect the output of Republic tires, the demand for which has been so great that the company is behind on orders.

The same officers that conducted the business of the Republic Rubber Co. have been elected to office in the Republic Rubber Corporation. They are: President, Guy E. Norwood; chairman of the board of directors, Thomas L. Robinson; general sales manager, H. A. Woodward. The old executive staff remains in office, but it will be enlarged by the addition of a number of new men, it is stated, in the near future.

MOTOR STARTER CORP. TO TAKE WARNER PATENTS.

The Motor Starter Corporation has been incorporated at Albany, N. Y., with a capital of \$2,000,000. The company will take over the patents of Henry K. Stewart and the Henry K. Stewart plant at Long Island City, for the manufacture of starters and electrical equipment.



Allen 1918 Chassis Shows Itself Rugged in Members and a Fine Frame to Support Attractive Body Jobs.

General News of the Industry

What Several of the Leading Car and Parts Makers, Selling and Allied Lines Are Planning and Doing

The Fisk Rubber Co, Chicopee Falls, Mass., report an exceedingly successful campaign for the second Liberty loan. Over 97 per cent. of the employees par-

has opened a new assembly plant at Kansas City, Mo. The structure, which cost \$400,000, has a capacity of 100 cars and 45 trucks a day. It is expected that



Clocks and Bulletin Board Used by the Fisk Rubber Co., Chicopee Falls, Mass., Checking Up Second Liberty Loan Subscriptions.

ticipated and they subscribed for \$333,200. The company subscribed for enough to bring the total up to \$1,000,000. Great enthusiasm was shown. When the campaign was started a dial was erected to indicate the progress of the subscriptions. It had a maximum amount of \$200,000 painted on it, but this amount was reached during the first 24 hours and another dial reading up to \$350,000 had to be erected on the big sign board, where tally was kept of the progress of the loan.

F. S. Macourck, for the past 14 years purchasing agent of the Peerless Motor Car Co., has resigned to engage in business for himself. He has been succeeded by R. G. Scott, his assistant for the past five years.

The Motor Accessories Corporation will open branches within the next six months in the states of Nebraska, Colorado, California, Ohio, Kansas, Idaho, Arizona, Utah and Montana. Separate branch managers will be in charge of each state.

The Cadillac Motor Car Co., Detroit, Mich., recently celebrated its 15th anniversary. The business was started in a one-story building and gradually increased to a point where over 1,000,000 feet of floor space became necessary to handle the production, which has totaled in value over \$245,000,000 in the 15 years. The company manufactured about 130,000 cars since starting.

The Maxwell Motor Sales Corporation

which cost \$10,000 each; a tire mounting machine, with which one man can mount 1200 tires a day. A large and complete stock of parts will be maintained, valued at \$750,000. The management and dealers in the territory celebrated the occasion of the opening with a dinner.

The Fenton Foundry Co., Almont, Mich., is turning out hub caps for the Oldsmobile company at the rate of 400 a day to fill an order for 60,000.

Al Poole has joined the sales organization of the Wire Wheel Corporation of America and will be attached to headquarters at Buffalo, N. Y. He was with the Bosch Magneto Co. for many years.

The Briscoe Motor Corporation, Jackson, Mich., which has been manufacturing the Redden truck makers, has also taken over the sales end of the business. The administration of Redden affairs is also being handled at the Briscoe headquarters.

The Packard Motor Car Co., Detroit, Mich., received orders for over \$1,000,000 worth of Twin Sixes on Oct. 30, establishing that day as a record breaker in the company's history. Sales for the six weeks ending on that date showed an increase of 30 per cent. over the corresponding period in 1916.

Alan Jamison has been appointed special representative of the Burd High Compression Ring Co. of Rockford, Ill., with headquarters at Baltimore, Md. F. C. Batchelder, formerly with the White company of Cleveland, O., has been appointed a factory representative of the company.

A. Schrader's Son, Brooklyn, N. Y., report that 54 employees are serving in various branches of the government service. A service flag with 54 stars flies outside of the company's plant on Atlantic avenue. The employees met the second Liberty loan by subscribing a total of \$365,000.



Elgin Motor Car Corporation, Chicago, Ill., Moves Steadily Toward Realization of Its Great Plant Shown in the Lower Picture. Upper View, Stage of Construction Recently Photographed.

Arthur H. D. Aitree, vice president of the Bosch Magneto Co., as manager of credits, sales and service, has tendered his resignation, which will become effective Jan. 15. Mr. Aitree was a pioneer



W. L. Agnew, Manager of F. E. Stuyvesant Motor Co., Cleveland, O., Distributors of Hudson Cars.

in the automobile business, having been first general manager of the Daimler Motor Co. of Coventry, England. For three and a half years he was manager of the Chicago branch of the Bosch company, and in 1914 was transferred to the main office in New York as vice president.

W. L. Agnew, formerly director of advertising and publicity for the Chalmers Motor Co., has been elected vice president and general manager of the F. E. Stuyvesant Motor Co., Cleveland, O., distributors of the Hudson Super Six car.

Geuder, Paeschke & Frey Co., Milwaukee, Wis., have completed arrangements with the Maxim Silencer Co. of Hartford, Conn., to produce and market exclusively a full line of Maxim Silencers

for trucks and passenger cars. This silencer is said to have excellent muffling qualities, while it does not result in back pressure against the cylinders and will be produced at satisfactory prices.

The Studebaker Corporation, South Bend, Ind., has declared regular quarterly dividends of 1½ per cent. on the preferred and 1 per cent. on the common stock, payable to holders of record Nov. 30.

The Jordan Motor Car Co., Cleveland, O., reports that its shipments of cars for the week ending Nov. 3 were the largest in its history. During the month of October shipments from the factory were 27 per cent. over those of the same month last year.

The Union Carbide and Carundum Corporation has been incorporated under the laws of New York state with an authorized capital of \$15,000,000. The company is the parent concern in the merger of the Prest-O-Lite Co., National Carbon Co., Union Carbide Co. and Linde Air Products Co. The incorporators are C. K. G. Billings, Myron T. Herrick and Charles A. Coffin.

The Jones Motor Car Co., Wichita, Kan., in addition to manufacturing the Jones line of passenger cars, is engaging in commercial contract work, including the making of limousine, coupe and all kinds of enclosed bodies and tops, also the manufacture of fenders, upholstering and bodies for trucks and commercial cars. The company's plant has 125,000 square feet of floor space and is made up of six separate brick factory buildings.

Castle & Kyte, 872 Woodward avenue, Detroit, Mich., exclusive sales representatives for the Hayes wire wheel, have opened over 500 branches throughout the country, including distributing stores in New York, Chicago, Detroit, Cleveland, Baltimore and Philadelphia. The agency in the latter city is Brown-White, Inc., 2222 Chestnut street.

W. G. Jarman, formerly treasurer and manager of the Canada Briscoe Motor

Corporation, Ltd., has been appointed sales manager of the Jackson Automobile Co., Jackson, Mich. Mr. Jarman, who has been in the industry for over 10 years, was first with the Maxwell-



W. G. Jarman, New Sales Manager of the Jackson Automobile Co., Jackson, Mich.

Briscoe at Tarrytown, N. Y. He was later put in charge of the car distribution of the United States Motor Co., Inc., prior to its reorganization into the Maxwell Motor Co., Inc. When the Briscoe Motor Corporation was formed Mr. Jarman became assistant sales manager and later went with the Canadian branch of the company.

A. J. Banta, formerly vice president and production manager of the Premier Motor Corporation, has been appointed assistant sales director of the Maxwell-Chalmers sales program. For many years Mr. Banta was with the Locomobile company as manager of the central western territory, with headquarters in Chicago.



Delegates to the Recent Convention of the Wives of Salesmen, National Cash Register Co., Dayton, O., Gathered on the Steps of the Famous N. C. R. Schoolhouse. Success Attended the Unique Gathering and Its Proceedings, a Resume of Which Was Given in the Automobile Journal of Oct. 25, and It Proved a Record Week for Orders.

PERMANENT ATLANTIC CITY SHOW

Famous Garden Pier Announces Automobile Exhibit as Constant Attraction, Begining Christmas Holidays

THE famous Garden Pier at Atlantic City, in addition to its many other points of attraction, will stage a permanent automobile show, where many of the latest creations of the leading automobile manufacturers of the country may be inspected by the throngs that pass daily along the great boardwalk.

Each exhibitor will have sufficient space to display three models, which can be placed in charge of either the impartial attendants and experienced salesmen which are furnished by the management, or a representative of the factory.

A huge electric sign, 144 feet long and 40 feet depth on top of the exhibition hall will be used to flash individual advertisements at night and the Pier company is planning the publication of a magazine for free distribution and each exhibitor will be entitled to two pages of advertising free. Movie screen advertising will also be used to advertise the cars on exhibition, and any commercial picture or film the exhibitor chooses to furnish will be shown.

An annual entrance fee of \$1500 which entitles the exhibitor to his space for 365 days, covers practically all of the costs. It is proposed to start the show during the Christmas holidays and to continue it permanently thereafter.

HEARNE WINS AUTUMN CLASSIC AT UNIONTOWN.

The Autumn Classic at Uniontown, Pa., held on Oct. 29, and the last important race on the speedway schedule for 1917, was won by Eddie Hearne. The distance was 168 miles and his time was 1:49:2.85. Tom Milton came home second in 1:49:27.45, and Earl Devore, finishing out Ira Vail's hand, came in third in 1:54:37.05.

The 50-mile consolation race was won by Fred McCarthy of Pittsburgh and also the three-cornered match race for the Uniontown speedway championship trophy.

MCNEAR AGAIN HEADS THE BAY STATE A. A.

At the annual meeting of the Bay State Automobile Association, George W. McNear was re-elected president. The other officers were chosen as follows: Vice president, A. E. Lerche; secretary, James Fortescue; directors, Dr. A. R. Crandell, W. H. Reed, W. M. Stevenson, A. P. Teele, John E. Kelley, Robert Shirley, John P. Coghlin, Edward Becker and Charles H. Pepper.

Secretary Fortescue, in his annual report, announced that the officers of the organization had been active during the year in opposing objectionable legislation, and that a number of clubs were

being formed in various parts of the state that would become affiliated with the association.

RECEIVER FOR ROSS CAR.

The court has appointed B. F. Everitt as permanent receiver for the Ross Automobile Co. An inventory is being taken of the company's property and it is believed that the creditors will get 100 cents on the dollar if the business and factory is sold.

DREXEL ASSETS SOLD.

The property of the Drexel Motor Corporation, Chicago, has been sold at auction. The assets were valued at \$122,410. The company was capitalized at \$2,000,000 and started business in July, 1916, to succeed the Farmack Motor Car Corporation.

Stockholders Win a Division of Ford Profits

Decree Will Affect \$30,000,000 of Surplus Funds if the Decree Survives Appeal.

A decision in favor of the Dodge Brothers has been handed down by Judge George S. Hosmer in their suit against the Ford Motor Co., asking that the defendant divide 75 per cent. of the \$59,000,000 profits of the fiscal year ending July 31, 1916. In the decree the judge ordered the division of but 50 per cent. of the profits, stating that "the acquiescence of a stockholder in the past will probably stop him from demanding full relief in the case at bar." Ford's attorneys have filed notice of an appeal from the decision, but in case it is sustained about \$30,000,000 of the Ford surplus will have to be divided among the stockholders.

RUBBER NOW BROUGHT THROUGH PACIFIC PORTS.

Before the war American rubber manufacturers were able to get crude rubber only through London, for England has always demanded that all rubber from the far eastern rubber plantations, which she controls, should be distributed from that city. But since the closing of the Suez Canal to merchant trade, as far as American shipping is concerned, all rubber destined for America has come across the Pacific ocean to our western ports. The importance of this trade to

these ports is shown in the \$5,000,000 worth of crude rubber business handled at Seattle, Wash., during the month of August.

Recently the largest shipment of crude rubber ever consigned to an American firm came across the Pacific from Singapore to Seattle, in the steamer Luise Neilsen, for the Goodyear Tire and Rubber Co., Akron, O. This shipment consisted of 25,000 cases of plantation rubber, weighing 1875 tons, valued at nearly \$3,000,000.

"DUPLEX DOINGS" GIVES HEAVY HAULAGE FACTS.

"Duplex Doings," the heavy haulage magazine, published by the Duplex Truck Co., Lansing, Mich., is the new organ through which the makers of Duplex trucks are keeping truck owners informed of the solution of heavy haulage problems.

The October number has a picture and description of the work performed by a Duplex in pulling a load of 13,000 pounds through the muddy oil fields of Wyoming, and also a story of another Duplex pulling a warehouse loaded with its usual stores a distance of four blocks. The weight of the building was estimated at 80 tons and the truck during the haul was loaded with three tons of cement blocks to give it traction.

Contractors and others interested in heavy truck work may receive the magazine from the Duplex Truck Co.

N. Y. AUTHORITIES PROPOSE DRASTIC ANTI-THEFT MEASURE.

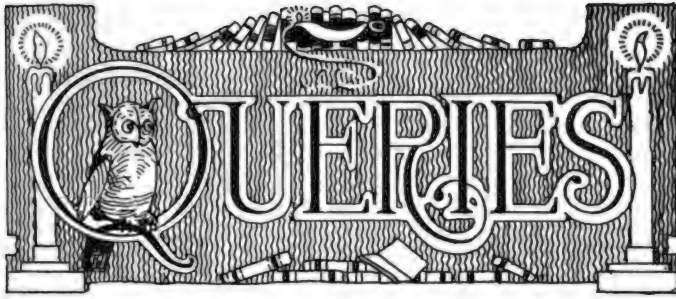
Commissioner of Police Arthur Woods of New York City practically admits the impotency of the police force in the metropolis in face of the rapidly increasing number of car thefts. Upon receiving a report that from Jan. 1 to Oct. 15, 1725 automobiles were stolen in New York City, an increase of 40 per cent. over the same period in 1916, he asked Corporation Counsel Lamar Hardy to draft a law compelling motor car drivers to lock their machines when leaving them unattended in public streets.

With such a law in force the commissioner says the members of the police department will be instructed to take cars that are not attended or properly locked to the nearest station house, and when the operator claims the car he will be served with a summons to appear in court for leaving his car unattended. Such a law of course would be tantamount to arresting every man practically who suffered the misfortune of having his car stolen, as the moment he reported it and admitted that it was not locked the authorities would arrest him.

Out of the total of 1725 machines stolen, 1466 were recovered, leaving 279 unaccounted for.

FORD CARS IN SEPTEMBER.

The Ford Motor Co. of Detroit made 62,365 cars in September, of which 60,982 were passenger cars and 1382 trucks.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU MANIPULATE THE SPARK ADVANCE LEVER ON YOUR AUTOMOBILE FOR POWER AND EFFICIENCY?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of December. The contest is open to every one.

LOCATING KNOCKS.

(F. A. Byerly, Buffalo, N. Y.)

Best Letter.

As a knock detector for locating noises in the engine or transmission of my car, I use a hard wood stick, about ½ an inch in diameter, nailed into the bottom of a common metallic salt shaker, from which the cover has been removed.

By placing the stick against the various parts and my ear against the salt shaker I can easily locate any knock, for the vibration of the stick is carried and magnified by the salt shaker box.

First I jack up the rear wheel. I always exercise extreme care in this and block the rear up firmly so that no amount of jar or vibration will shake the wheel on to the floor. Then I start the engine and listen for knocks with my detector. After I have gone all over the engine and transmission I engage the emergency brake just enough to put a slight drag on the engine and make conditions similar to those encountered on the road, then listen again.

After the engine has been tested out I try all of the speeds, one at a time, and listen for knocks in the transmission.

Mr. Byerly's idea of using a salt shaker and stick for locating knocks is a good one. There are a number of devices now on the market which are designed along the same lines, namely, to centralize the vibration. The salt shaker stick combination, though simple, is effective. A little better looking apparatus may be made from an old telephone receiver and a stick. The handle of the receiver is hollowed out and the stick fastened by a screw or nail to the diaphragm. Much of the tinny sound present in the tin box is eliminated with this apparatus.

YOU SEE

the hottest, quickest, best timed spark you can get is none too good in view of the low grade fuel you are now forced to use.

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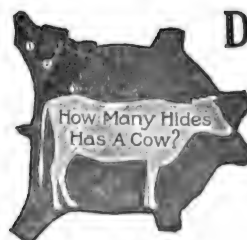
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AC Plugs have proven to be the best under all conditions. That is why 80 manufacturers of Automobiles, Trucks, Tractors and Aeroplanes use them for regular equipment. The leading race drivers are using them. Your motor will not give its best performance unless equipped with AC. You will come to them in time. Why not buy a set now and note the improvement?

CHAMPION IGNITION CO., Flint, Michigan, U. S. A.

Though an experienced ear can usually definitely locate a slight knock, the amateur finds it a difficult matter to find the loose bearing or bushing that is causing the trouble. Not long ago one of our readers wrote us a letter relative to a knock which seemed to be in the engine. Indications later proved that the trouble was in the universal joint and not in the engine. This simply shows the extreme difficulty of locating knocks which are carried along the metal parts very easily.

(R. S. Albertson, Benton, Pa.)
Second Best Letter.

In locating knocks I first jack up the rear wheels of the machine, then start the engine. With a stick of wood, about $\frac{1}{4}$ or $\frac{1}{2}$ inch in diameter, between my teeth, I go all over the engine bearings, touching the bearing with the stick. The vibration or knock will be transmitted through the stick to my teeth and when the ears are stopped is very audible. I try the transmission in the same way, engaging the different speeds, one at a time, until I have tried all combinations.

DIFFICULTY IN STARTING FORD CAR.
(T. K., Dorchester, Mass.)

I have a 1912 Ford car which starts very hard, though after the engine has warmed up it works very well. A few days ago I started out in the morning and could get but little power from it, later in the day it ran perfectly, though a little weak on the hills. The cylinders are clean, the valves have just been ground, the pistons are fitted with leak proof rings, the electrical system is practically new, having been thoroughly overhauled in the spring. What do you think is the trouble?

Your trouble is evidently in the carbureting or intake system, though undoubtedly before the winter is over many drivers will have the same trouble with their cars. Much of the trouble is due to the low grade of fuel, which though containing more heat units, does not vaporize at low temperatures. If your carburetor is not fitted with a hot air connection be-

tween the manifold and air intake, you should so equip it. By doing this you will probably have a smoother running engine.

Make a careful examination of the intake system. Remove the intake manifold and install new copper asbestos gaskets, liberally coated with shellac, at the two points where the manifold is joined to the engine block. Be sure that the gasket between the carburetor and manifold is absolutely tight.

A common cause for loss of power can be traced to the valve bushings, which often wear very rapidly. As soon as the valve stems or bushings wear, allowing air leakage into the valve pockets, the mixture is diluted and loss of power results. It is absolutely essential that the intake line be leak proof, and that all of the joints are tight.

If the compression is good it is an indication that the pistons and valves are in good condition. If the compression is poor you should make an inspection of the valves. Be sure that the fit is tight and there is the proper $\frac{1}{64}$ inch clearance between the push rods and valve stems when the engine is heated. If the valves fit tightly, but the compression is still poor, indications are that the piston rings are not properly fitted.

Be sure that the carburetor float level is properly adjusted. The gasoline level should not be more than $\frac{1}{8}$ inch below the needle valve outlet. You can adjust this level by bending the float arm and make the measurement with a straw or wire through the needle valve opening.

ACTION OF SPLITDORF MAGNETO.
(F. C., Aurora, Col.)

Will you kindly explain the action of the Splitdorf magneto system? Will you also show the path of the current with the breaker points both open and closed?

The Splitdorf magneto is of the low-tension, alternating current type. As the armature revolves the lines of force crossing the winding are cut in, increasing number until the so-called peak of production is reached; the voltage then be-

gins to drop until it reaches zero and then builds up to its peak in the opposite direction. This happens if the circuit is established in the armature winding.

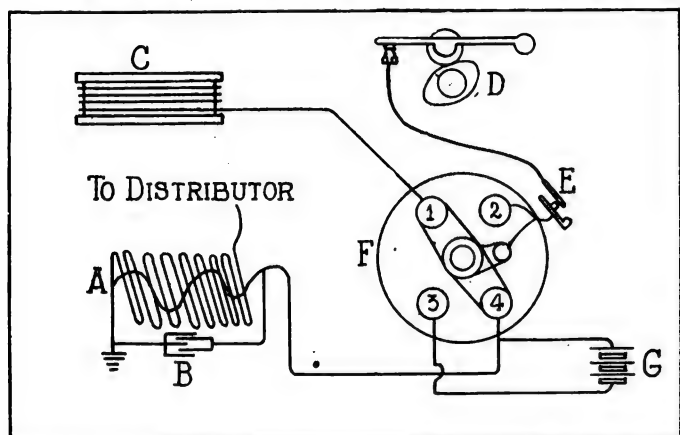
Referring to the accompanying diagram, C is the armature winding, one end of which is grounded to the frame, the other is connected with the centre terminal or so-called primary collecting brush.

Leading from this is a wire which connects it with the switch terminal No. 1. Switch terminal No. 2 and the switch bar are connected as shown with the starting button E, which is in turn connected with the ungrounded platinum contact in the breaker box.

With the switch on the magneto position as shown, current passes from the armature to the switch terminal L, across the bar to the centre. If the cam at D is down in the position shown the current then passes from the bar through E to the platinum points of the breaker points, through them to the ground and back to the armature.

When the platinum points in the breaker box are separated this circuit is broken, and the current instead of passing from the bar to E, passes from the bar, through terminal No. 4 to the primary winding of the coil, through it to the ground and back to the armature. As it passes through the coil it induces a current in the secondary winding, which is carried through the distributor to the spark plugs.

The point at which the platinum contacts in the breaker box separate is at the peak of production, so that the maximum amount of current passes through the spark coil. The condenser E is connected across the coil of primary windings



Splittorf Ignition System Wiring Diagram. A, Spark Coil; B, Condenser; C, Magneto Armature; D, Breaker Box Mechanism; E, Starting Button; F, Switch; G, Battery. Switch is Set for Magneto Ignition.

to absorb the flow of excess current.

With the bar in the battery position the connection between terminals Nos. 1 and 4 is broken, and a connection is made between Nos. 2 and 3. The current then flows from the battery to terminal three, across the bar to E and thence across the platinum contacts of the breaker box, if they are together, to the ground. From the ground through the coil and back to the battery.

As this flow of current through the coil is interrupted by the snapping apart of the contacts at D, the secondary current is set up in the coil. The secondary current flow is set up only at the coil as the points separate. To fire a charge of gas in one of the cylinders the arrangement at E is designed so that the contact points may be separated, breaking the circuit and inducing a secondary current in the coil.

LOSS OF POWER IN CADILLAC 1912 CAR.

(D. J. M., Greenwich, Conn.)

Will you kindly give me some information relative to a Cadillac 1912 car? My car does not seem to give any power on the hills though I have recently installed new leak proof piston rings, put on a Stromberg model M 2 carburetor, ground the valves, adjusted the valve and tappet clearance, removed the carbon and tested the intake system for leaks, but found none. The mileage averages about $8\frac{1}{2}$ miles to a gallon. The valve bushings are worn pretty badly. Would

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912, OF

THE AUTOMOBILE JOURNAL.

PUBLISHED SEMI-MONTHLY AT PAWTUCKET, R. I. For Oct. 1, 1917.

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of The Automobile Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

PUBLISHER, W. H. & D. O. Black, Jr....Pawtucket, R. I.
EDITOR, E. H. CUSTER.....Pawtucket, R. I.
BUSINESS MANAGER, W. H. Black....Pawtucket, R. I.

2. That the owners are:

W. H. BLACK.....Pawtucket, R. I.
D. O. BLACK, JR.....Pawtucket, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

M. J. BLACK, Mortgagee.....Pawtucket, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed) WILLIAM H. BLACK, Co-Partner.
Sworn to and subscribed before me this 20th day of Oct., 1917.

(Signed) THOMAS BESWICK, Notary Public.
[Seal] (My commission expires June 30, 1920.)

this make a difference? The engine will not throttle down very well and knocks if forced up a hill.

Will you also tell me how to drain the oil from the crank case? The electrolyte in the storage battery tests to 1.200. Is this right? The starting motor does not turn the engine over fast enough to start it unless the engine has heated, and the lights do not burn brightly. What do you think the matter is with it?

How are the timing gears lubricated in this model Cadillac? Is the lubrication automatic or is it necessary for me to oil them?

Your trouble is probably due to the excess air admitted around the loosely fitting valve guides. It is very essential that the valve stems fit the guides, or air will be admitted around the intake valves, weakening the mixture to such an extent that its explosive power is greatly impaired. To nullify this to a certain extent more gasoline must be used, which probably accounts for the excess gasoline that you are now using. We would advise you to make a very careful examination of the intake line, as well as the valves, replacing the bushings or valves, so that a tight fit is assured.

There is evidently trouble in your battery system, for the electrolyte should have a specific gravity, under ordinary conditions of from 1.285 to 1.300. We would suggest that you have the battery charged at a regular charging station. If the electrolyte again shows a drop to 1.200 it is an indication that the generator is not charging at a high enough rate and should be inspected by a repair man experienced in this class of work.

A careful examination of the ignition unit should be made, the distributor cover should be taken off and cleaned with a soft cloth. The platinum points of the breaker and contact arms should be smooth and unpitted. This is vital, as the action of the current often wears off the surfaces to such an extent as to result in much loss of power. The distance between the platinum points should be adjusted to .010 of an inch when the contact arm rests in the space between the lobes of the cam.

You will probably find that the starting motor will run up to full speed if the storage battery is fully charged. If it does not, carefully examine all of the wiring, particularly at the battery terminals, where corrosion is very apt to increase the resistance.

No provision was made on the 1912 engine for draining the oil from the crank case, though it is an easy matter to siphon the oil out from the side plates.

The timing gears are lubricated by the oil from the engine, and beyond the ordinary upkeep of the regular oiling system no further attention will be necessary.

WATER VAPOR IN ENGINE.

(F. R. F., Brockton, Mass.)

Can you tell me why my automobile seems to give better results on a foggy evening or when it is raining, than on a pleasant day? At times I can cut the gasoline supply down about 25 per cent. and get more power.

It is a well known fact, and one that has been substantiated in the past year, that the introduction of water vapor results in more power and the elimination of carbon. Water is composed of two gases, hydrogen and oxygen, in such proportions that as a gaseous mixture they form a violent explosive, even stronger than gasoline and air. When the vapor is admitted to the engine and subjected to the intense heat of the explosion it is partially decomposed into its gaseous form, immediately forming an explosion which adds to the power of the original explosion of gasoline and air.

In addition to the explosive effect of the water vapor, the introduction of water tends to drive off carbon accumulations and thereby increase the efficiency of the engine.

For these two reasons an engine gives more power on a damp or foggy day, since the air supply is more or less mixed with water vapor.

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WHITE CAR STEERING GEAR.

(J. L., Richmond, Va.)

Will you kindly tell me how I can take up the lost motion in a White car steering gear?

The steering gear of a White car is of the worm and sector type and fitted with two adjustments. The first is designed for taking up the end thrust of the worm, mounted on the steering shaft. This adjustment is located on the lower end of the steering gear, next to the throttle and spark advance gears. Loosen the binder screw and turn the large nut clockwise until all up and down motion of the steering shaft is taken up. Be careful not to tighten the nut too much.

The second adjustment for bringing the sector closer or carrying it away from the worm is located on the side and consists of a so-called eccentric bushing, which carries the sector and ball arm. By turning the eccentric bushing the sector is moved nearer or farther away from the worm. The bushing is locked by a set screw located on the under side of the steering gear hub.

HUPMOBILE.

(Continued from Page 16.)

bracket. This bearing should be replaced, if it shows wear, since it will cause considerable noise, if there is any play in the shaft.

The fan belt pulley of model K machine is retained on the shaft by a nut located in the pulley. When this nut is removed the pulley may be pulled from the shaft with a wheel puller and the shaft may then be withdrawn from the front of the housing.

Points on Removing the Crankshaft.

After the chains have been removed and crankshaft bearings taken off, the crankshaft may be removed from the engine. The flywheel is fastened to the crankshaft by cap screws. It is essential that the flywheel is firmly fixed to the shaft or a knock will result. If there is any play the cap screws should be removed and larger ones substituted.

The camshaft is retained by a thrust washer, which is located in the front of the case, directly in back of the distributor drive gear. This thrust washer is fastened in place by two nuts on two studs, and must be removed. The camshaft may then be pulled from the case toward the front. Unless the crank case is turned upside down the tappets will fall against the cams and cause trouble. The three camshaft bearings are retained by set screws, which are located in the top of the crank case, directly above the camshaft centre line.

Unless there are signs of extreme wear none of the timing sprockets need be removed from their respective shafts. The outside sprocket on the camshaft is retained by a nut and keyed to the shaft; it may be removed with a wheel puller. The small gear on the camshaft is retained by a pin in the hub; when this pin has been driven out the gear may be pulled from the shaft. Both the gears on the crankshaft may be pulled off with a wheel puller after the left hand nut has been taken from the end of the shaft.

Exploring the Oiling System.

It is of the utmost importance that all of the oil passages are free from dirt or sediment. From the flywheel housing the oil is thrown by centrifugal force through a U shaped tube to the distributing centre, where it is carried through a strainer to the oil header, from thence it is forced to the crankshaft bearings, the chains and the tappets. All of the passages should be flushed with kerosene oil and cleaned by means of a stiff wire. The small passages in the crankshaft should also be cleaned in the same way.

The transmission assembly should be removed from the car. After all of the control rods have been taken off the cover upon which is mounted the speed control should be unbolted from the housing and the steel cover over the universal joints slipped back, exposing the bolts holding the joint together. When these bolts have been taken out the transmission with clutch may be taken from the chassis. The drive shaft assembly is disconnected from the rear axle in the same manner.

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Worcester, Mass.
Detroit, Mich.



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A broken spring—a frenzied customer calling for help—demanding a new spring “rush”! It’s an odd size; you have none in stock to match it!

And yet, you realize the importance of giving this customer real service, not particularly for the profit in this one job alone, nor even for the trade of this one customer, but because service at a time like this will bring the word-o’-mouth publicity which follows naturally when a customer is pleased.

So you call

Harvey
RACINE

to the rescue. There’s a Harvey Jobber near you, you get him on long distance, in a few words tell him your needs, and then turn to your customer with the satisfied feeling of work well done, because you know that already the exact spring you want and the best spring money can buy is speeding to you.

“That’s service”! says the customer. And when his car is on the road again he tells his friends about it and they say with him, “That’s service”!

That *is* Service, Harvey Service, and it’s always ready to help you build a business that will be respected far and near. They may forget the name of the spring you used but the memory of the service you have given will never be lost.

There’s A Harvey Jobber Near You

Drop us a card and we will send you his name and our Spring Book giving complete weights, styles, measurements and prices of over 900 different kinds of springs. Write today—you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.
915 17th St., Racine, Wis.

The first step in the disassembly of the transmission is the removal of the clutch assembly. The clutch release yoke, which is keyed to the clutch pedal shaft is pulled from the shaft and taken from the housing. On the model N machines, located at the front of the discs, resting against the crankshaft, is a nut, which is kept from turning while in the machine by set screws. This nut is screwed on to the transmission driving gear and holds the disc assembly of the clutch together. On the model K machines the nut is retained in the same manner, but screws into a sleeve rather than on to the gear as in the model N. After the lock screws have been taken out the nut should be removed, permitting the removal of the disc assembly, together with the thrust bearing.

When the disc assembly has been taken from the housing the clutch springs may be compressed in a vise and the studs removed; this will permit the removal of the clutch discs. The front covers of both the model N and K transmission gearsets are held to the housing by bolts, which should now be removed, permitting the removal of the driving gear, together with its bearings.

The countershaft gears are mounted upon the constant mesh gear and fastened to it by a key and pin between the two small gears. Drive out this pin and the constant mesh gear may be drawn from the front of the case, while the three-gear casting may be removed through the top of the case. With the gears removed the roller bearings may be driven from the housing, after the set screws have been taken out.

The rear bearing of the main shaft is retained by a collar, which is fastened to the housing by screws. These screws may be taken out and the shaft with flange (model N), or with universal (model K), removed, leaving the sliding gears in the housing to be removed through the top.

After the universal joints have been disassembled from the drive shaft, either main member may be removed and the shaft slipped from the housing. The universal is keyed to this shaft and retained by a nut. When the nut is removed the universal may be pulled off with a wheel puller.

Adjustments on the Rear Axle.

In making repairs and adjustments on the rear axle it will be unnecessary to remove the whole housing, for the differential may be removed without disturbing the wheels or removing the springs. The first step is the removal of the bolts holding the wheel flanges to the wheels, then these are taken out, the driving flanges, together with the axles, may be taken from the car.

The differential assembly is mounted on the casing, which carries the pinion gear and rear universal. The nuts should be removed and this casing taken out of the rear axle housing. Both the pinion gear and differential assembly are mounted on ball bearings. Two caps, which are retained by two nuts each, hold the differential bearings in place. When these are removed the differential housing may be lifted out, together with the bearings, which may be taken from the housing. Eight cap screws fasten the two parts of the differential housing together; remove these and the differential is disassembled.

In removing the pinion gear assembly with bearings the first step is the removal of the gear with a wheel puller. This gear is keyed to the shaft and retained by a lock nut, and when removed the shaft may be slipped from the bearings. The front bearings are retained in an adjustable collar, which may be unscrewed from the housing, while the rear may be driven from the housing with a wood or metal bar, taking care to drive upon the outer race.

Examination should be made of all bearings in the rear construction, and should the bearings or bushings show wear replacement is advisable, for any looseness will be evidenced by the groaning or grinding of the axle while the car is in motion.

Pinion and Drive Gear.

The proper adjustment of the pinion and drive gear is a matter of extreme importance and this adjustment is made very easily upon either of the models N or K. The differential should first be assembled together with the pinion gear and shaft. It is essential that all of the bearings are clean and bottom against their respective seats.

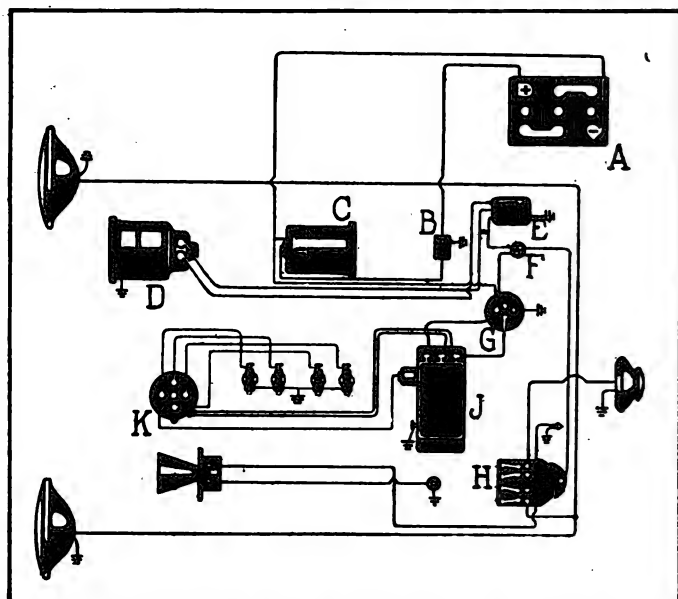
To the universal joint flange upon the pinion shaft fit a wooden handle so that this shaft can be turned by hand, then turn the pinion adjustment until there is no play in the shaft. The shaft must not bind, however. The backs of the pinion and master gears should be together and a slight amount of clearance left between the gears. The pinion shaft should then be turned and the results noted. If the gears bind the differential adjustments should be made to carry the gear farther away from the pinion.

When the adjustments have been made properly there will be no bind and but little lost motion. The two differential bearings should then be tightened and the lock screws put into place. The differential and pinion assembly may then be returned to the rear axle housing.

Rear Wheels and Steering Gear.

The rear wheels are held on to the housing by large lock nuts. The bearings are forced on to the housing and may be removed with a wheel puller. The front wheel retaining nuts are exposed by the removal of the hub caps. When the front wheels are replaced a slight amount of play should be left or the roller bearings will be destroyed very quickly.

The steering gear housing is in two sections, the lower or main part carries the steering arm and is bolted to the frame; the upper part, which is retained by four screws to the main housing, carries the thrust bearing and steering column. This part should be taken from the main housing, allowing the re-



Wiring Diagram for Westinghouse System, Cars from 60,000 to 75,000. A, Battery; B, Starting Switch; C, Starting Motor; D, Generator; E, Voltage Regulator; F, Ammeter; G, Ignition Switch; H, Lighting Switch; J, Spark Coil; K, Distributor.

moval of the steering column, together with the sliding blocks. As this assembly is taken from the housing the blocks separate from the worm. The rest of the mechanism may be exposed by removing the cover plate on the side of the main housing.

Timing and Adjustments.

In replacing the silent chain on the timing sprockets it is essential that the camshaft and crankshaft bear the proper relationship to each other. The proper setting may be determined from the markings on the flywheel. Turn the flywheel until the mark E-C, 1-4 is directly on the top and turn the camshaft in a counter clockwise direction until the exhaust valve of either one or four cylinder is just closing, then put on the chain.

To check up this timing turn the engine over until the piston in number one cylinder is at the top of its stroke. The exhaust valve on number four cylinder should be just closing and the inlet just beginning to open.

Ignition is had by the Atwater Kent system, automatically and manually controlled. Cars fitted with the automatic control are timed as follows: Turn the crank until number one piston is at the top of its stroke and the mark 1 and 4 CL is

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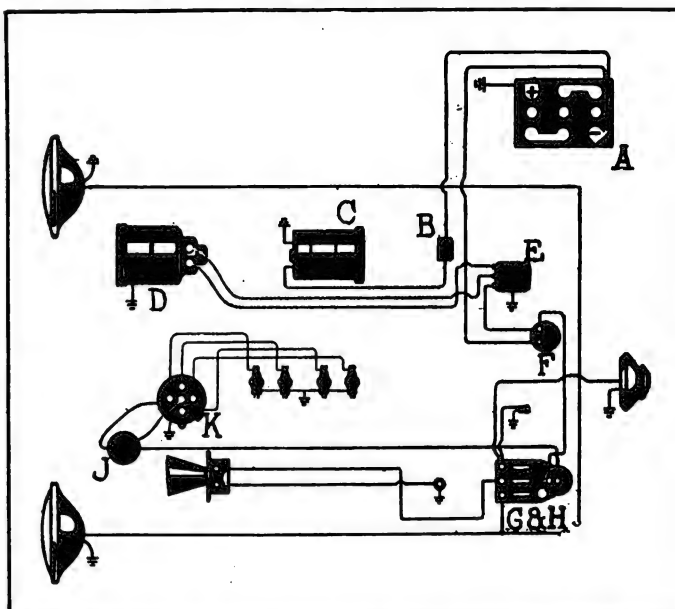
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directly on top of the flywheel, then continue to turn it until the mark is past the top centre about two inches. With the engine in this position loosen the large hexagon nut just beneath the distributor, then rotate the distributor in the opposite direction to which the timer shaft revolves, slowly, until a click is heard. Then without allowing the distributor to move, securely clamp the hexagon nut in place. The distributor segment will be opposite one of the secondary terminals. This terminal should be connected with number one cylinder, the other terminals should be connected in the firing order 1-2-4-3, in the direction which the distributor brush travels.

On cars fitted with the manual control the spark lever should be set in a horizontal position, the two nuts on the control rod connecting the distributor loosened and the engine timed as directed for the automatic advance.

The carburetor is a Zenith and beyond cleaning requires no adjustments. Both the main and compensating jet have certain sized openings, made at the factory, so that unless the jet is replaced with a new one there cannot be any change made.

Model K machine was equipped with a Westinghouse single unit starting and lighting system. The motor-dynamo was of the third brush type Westinghouse, with grounded wire. The wiring diagram for this type is very simple and is shown, together with ignition system, herewith.



Wiring Diagram for Westinghouse System, Cars After 75,000. A, Battery; B, Starting Switch; C, Starting Motor; D, Generator; E, Voltage Regulator; F, Ammeter; G and H, Ignition and Lighting Switch; J, Spark Coil; K, Distributor.

Two electrical systems for starting and lighting were used on the model N machines, the Bijur and the Westinghouse. The Bijur equipment covers cars up to 60,000, the Westinghouse from 60,000 on. Two styles of switchboards were used on the Westinghouse system, the first on cars between 60,000 and 75,000; the second style having three fuses only, on cars after 75,000. The three wiring diagrams are reproduced herewith.

The output of both the Westinghouse single unit on the model K car and the Bijur generator on the model N machines is controlled within certain limits by the position of the third brush. If the current generated is over 12 amperes there is danger of ruining the battery through overcharge, and it is essential that the output be lowered. This is done by swinging the third brush opposite to the rotation of the armature to such a point that the current generated is at the required point.

The output of the later Westinghouse generator on machines numbered after 60,000 is controlled by a current regulator unit, indicated in the wiring diagrams by the letter E. The adjustment of this unit should be made only at a service station.

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1917 SALES

FOREIGN BUSINESS \$90,958,243.00

From National Automobile Chamber of Commerce,
7 East 42nd Street, New York, August 27, 1917

Embargoes Affect Motor Car Exports

Thirty-five Per Cent. Decrease in Shipments to Great Britain, France and Russia During Last Fiscal Year—Big Increases to All Other Countries—Shipments Total 80,811 Cars, Valued at \$90,958,243—Thirty-three Hundred More Vehicles Exported, But Aggregate Value is \$6,507,000 Less—Fewer Trucks and More Passenger Cars.

Figures just issued by the Department of Commerce show that during the 12 months ended June 30, 1917, the United States exported 80,811 automobiles and motor trucks, valued at \$90,958,243, as compared with 77,499 cars, valued at \$97,465,811 during the preceding fiscal year.

Analyzing the official figures, the National Automobile Chamber of Commerce finds that the increase in number of cars exported is due to the larger shipments to most countries outside of Europe, which more than offset the decreases in exports to Great Britain, France and Russia, due to import prohibitions and lack of shipping facilities.

The fact that the aggregate value of exports during the last fiscal year was less by \$6,507,000 than in the preceding year, while the actual number of vehicles exported was greater by 3312, is due to decreased shipments of trucks for war purposes, the average value of which is much higher than the average value of passenger cars exported to countries outside of Europe.

Exports of commercial vehicles and passenger cars during the two years were as follows:

	1916		1917	
	No.	Value	No.	Value
Commercial....	21,265	\$56,805,548	15,977	\$42,337,315
Passenger.....	56,234	40,660,263	64,834	48,620,928

Thus, while the number of trucks exported fell off 5288 in the year and their aggregate value was \$14,468,233 less, the shipments of passenger cars increased by 8600 and their value by \$7,960,665.

Great Britain and France were still our largest markets, despite their heavy falling off in purchases. The former bought \$18,508,442 worth last year, mostly trucks, as against \$26,147,232 worth in the previous fiscal year. France's imports were nearly all trucks and amounted to \$14,691,460, as compared with \$19,137,904 in the 12 months ended June 30, 1916.

Owing to shipping difficulties and internal political

troubles, Russia's imports fell from a value of \$15,686,874 in 1916 to \$6,371,982 in the last fiscal year.

Exports to the rest of Europe combined increased remarkably, when it is remembered that no shipments went to the central empires. The increase amounted to more than \$1,000,000 in the year, accounted for largely by exports to the Scandinavian countries, Holland and Spain. Europe as a whole took slightly less than one-third by valuation of the total American exports.

Aside from the European countries, Canada is America's best customer for motor cars, having increased her purchases by nearly \$4,200,000—from \$7,280,151 in 1916 to \$12,088,787 in 1917.

Next comes Asia and Oceania, with imports of 9716 cars, valued at \$10,093,720 last year—an increase of \$1,450,927. Australia follows, with 5000, valued at \$4,213,874. The British East Indies increased their purchases from \$2,307,739 to \$3,617,351.

In the Americas, after Canada, the West Indies were our best market for automobiles, to the extent of \$4,072,647—an increase of \$1,248,735 over the year before.

The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workmen.

If you are a member of the Foreign Trade Bureau conducted by the Automobile Journal Publishing Company you can reach 8,000 foreign buyers of pleasure cars, trucks, fittings, supplies, accessories, tools and equipment in more than 81 foreign countries.

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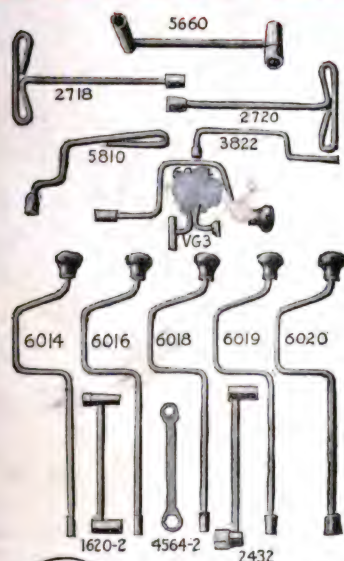
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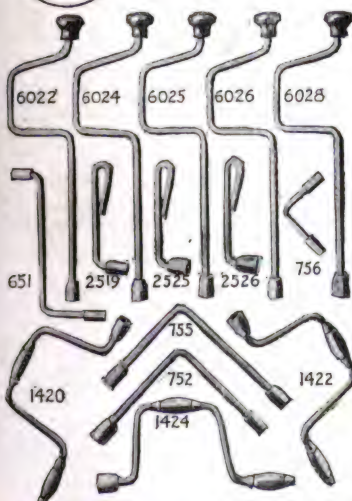
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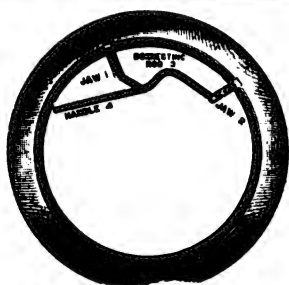
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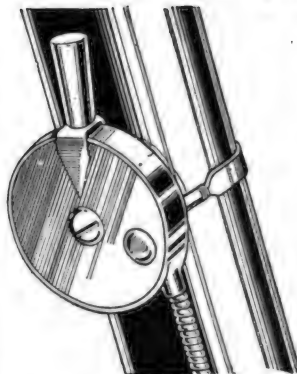
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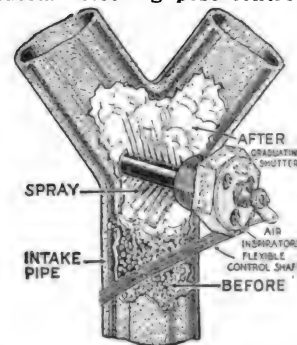


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A SUBSCRIPTION to the Automobile Journal makes one of the most acceptable, useful and valuable of gifts to your motorist friend. Send orders early in order that the recipient may have the yuletide gift promptly.

IF there is one thing more than another that the condition of a foreign war has emphasized, it is the essentiality of motor cars. After a period of disturbance natural to the adjustment of the industry to government demands, a more settled market is to be anticipated. If prices rule higher on new cars and used cars, as a number of large trade interests indicate, it is simply an effect to be expected from such curtailment of production as war needs may necessitate. To the motorist whose needs for quick transportation are more liable to increase than to decrease during the period of the war, it is almost needless to say there is no time like the present to make purchases of cars and car equipment.

UNIFORM traffic laws throughout a state, such as New York is establishing, has aroused quite a sentiment in New England for a larger co-operation, which will be beneficial to the motorist. If so great and important a touring section as the six states which comprise New England will take up the matter seriously, arranging for uniform traffic laws, marking of routes and licensing, as advocated by the National Automobile Association, it is believed another great forward step will have been taken. Important legal decisions and other valuable information are also found in the association's section in this issue of its official journal. Send application for membership to 9 Park street, Boston, Mass.

VOL. LXIV.

NOV. 25, 1917.

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Treasurer . . WILLIAM H. BLACK
 Secretary D. O. BLACK, JR.

Published the 10th and
 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.
 Times Building, Pawtucket, R. I.

COLD weather came with a rush on the eastern seaboard and it caught many motorists unawares in the regard of supplying themselves with supplies for the car and garage. A fine analytical study of various types of winter heating equipment is included in this issue. The products shown, tested ones of high quality and superior efficiency, commend themselves to all motorists who wish to give their cars proper care and insure themselves quick and efficient winter transportation.

DESPITE the distracting influences of war conditions and war necessities, the eyes of all motordom turn to the great national shows at New York and Chicago, which will disclose to all the cars and products of 1918. These big events come soon after the Christmas holidays. Plans for the first, the New York exhibition, are being completed rapidly. The annual big show number of the Automobile Journal will have a very important section devoted to the models of 1918, the makers, car production and constructional details. Replete with information and lavishly illustrated, this issue of the journal fills the function of an indispensable guide to show visitors and members of the industry.

FUEL saving suggestions of the National Automobile Chamber of Commerce remind the motorists of America that this is an avenue of conservation that saves at both ends, benefiting our boys and the Allies "over there," as well as benefiting themselves here.

ATTENTION is again called to the practical mechanical questions in the Queries department on page 41, containing suggestions no one can afford to miss. The prize letter subjects are open to all readers.

Only Hitting On Three ? Ford Owners Avoid This When They Equip With-

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Hupmobile	Knox	McFarlan	National	Phianna	Drive	Moreland Trucks
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Haynes	Pathfinder	Davis	Stephens	(Canada)	Sterling Trucks	Samson Tractors
Chevrolet	White	Monroe	Dodge Bros.	Gabriel Trucks	Diamond T	Stewart Trucks
Locomobile	Daniels	Singer	Henderson Bros.	Trucks	Trucks	Robinson Fire Trucks
Disbrow	Westcott	Hatfield	Delco-Light	Signal Trucks	Federal Trucks	Titan Trucks
Dorris	Duesenberg	Lexington-Howard	Murray	Maxim Trucks	G. M. C. Trucks	

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Blankets won't help much if—

if the oil you are using does not flow freely at Zero.

SUPREME AUTO OIL flows freely at Zero.

STARTS WITH THE ENGINE

THIS is most important during the Winter months. You should know whether the oil you are using "flows freely at Zero". All oils do not possess this feature—notably the paraffine-base oils, which thicken up under cold and often cause great damage to the motor.

The safe way is to ask for **SUPREME AUTO OIL**—it "Flows freely at Zero" and leaves less carbon, owing to the fact that it is a Southern Asphalt-base oil containing no paraffine to gum, stick or thicken.

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THE Automobile Journal

VOL. LXIV.

NOVEMBER 25, 1917.

NO. 8.

Essentiality of the Automobile Firmly Established in the Face of Current Conditions

Manufacturers and Dealers See Things Shaping Themselves for an Era of High Prices on New and Used Cars—Short Haul Work and Suburban Life Big Factors of Demand Now

AS STATED in last issue of the Automobile Journal, things are so shaping themselves in the motor car industry and country that the coming year will witness, leading manufacturers say, the highest prices for new motor cars and used cars, particularly affecting the latter, that have so far been experienced.

This condition will obtain because the demand will far exceed the supply, and motorists who have been accustomed to buying a new car each year and putting their old one on the used car market, may be expected to continue with their present machine. As over 80 per cent. of the new car business involves a trade in, this condition will mean that next year there will be a cut of 80 per cent. in the number of cars appearing in the used car market, or approximately that amount. Theoretically speaking, if the production this year was to have been 1,500,000 machines, and the curtailment is only 33 per cent., but 1,000,000 cars will be left to satisfy the demand that would consist of 300,000 buyers of new cars without a machine to trade in and 1,200,000 buyers with a car to trade. On the basis of what will be produced, assuming that 1,000,000 cars is the figure, there would be only 200,000 new motorists supplied and 800,000 supplied who had cars to trade in, making a difference of some 400,000 used cars that would come on the market.

The error in this computation would be found in the number of old cars that go out of service annually, which, of course, is correspondingly increasing with the increase in the number of cars in service, but as there are no accurate figures showing this total depreciation it would have to be approximated by assuming that the average life of a car is six years. On this basis the total production of 1911, or 200,000 cars, would cease to be serviceable this year, leaving only 600,000 used cars to come on the used car market to meet the demand unfilled for 500,000 cars created by the curtailment, and the 200,000 created through total depreciation of cars, leaving an absolute shortage all around of about 100,000.

Cars Never Non-Essentials.

There are approximately 4,250,000 cars in use in the country at present and as the latest advices seem to indicate that gasoline will continue plentiful, there is no reason why there should be any curtailment in their use on the grounds that they are "non-essentials."

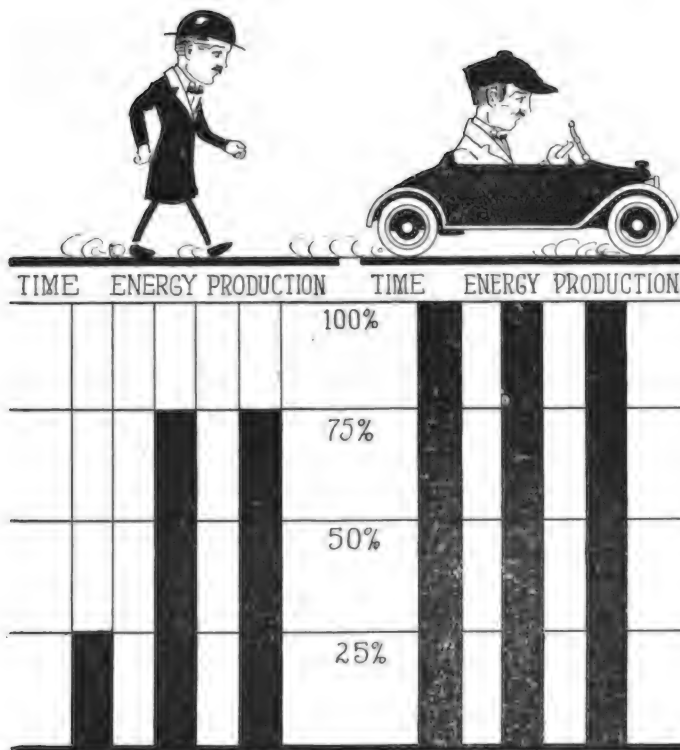
With the question of curtailment still in abeyance the passenger car outlook is indefinite, but many experts have voiced the opinion that any extensive cut in the production of cars is not probable. It is a safe prediction, however, that there will be a shortage of new cars and that the demand



Automobile Industries Committee: Left, John R. Lee, Ford Motor Car Co.; Centre, A. W. Copland, Chairman, Detroit Gear Co., M. A. M. Representative; Right, Hugh Chalmers, Chalmers Motor Co., Representative of the National Automobile Chamber of Commerce.

will be so great that prices will rise further and used cars will sell readily.

There has been extensive discussion of the question of "non-essential products," as the passenger cars were classified in the dispatches from Washington on the curtailment matter. The opinion that this attitude on the part of the officials toward the automobile is wrong seems to have more adherents than opponents and several well known leaders in the industry have given public interviews on the subject containing facts to show that the passenger car is really a great factor for efficiency and economy in business and a powerful instrument in maintaining the health and well being of millions of people. In fact, some of these men are urging



More Time, Freshness and Vigor, More Production for the Man Who Uses a Car.

the motorists to use their cars more than ever in every possible way as a means of relieving the congestion in transportation channels of every description.

Mr. Willys Speaks Decisively.

John N. Willys, president of the Willys-Overland Co., in speaking of the passenger car as a factor in increasing the user's efficiency, says: "Our entrance into the world war has made our people realize more and more the utility of the motor vehicle. Each day makes the general public realize more that the automobile is not merely a pleasure car—the term is a misnomer.

"Today the automobile takes rank with the telephone, telegraph, electricity and the railroads as one of the greatest utilities at our disposal."

Mr. Willys then went on to cite an example of a man working in an office position and how the purchase of a motor car lead to an improvement in his health, more leisure time at his disposal and promotion in his work. Also the stimulating effect of that purchase on many lines of business.

Col. Colt's Strong Indorsement.

Another strong indorsement of the automobile was made by Samuel P. Colt, president of the United States Rubber Co., who not only pointed out its great utility, but showed why the more extensive use of all kinds of motor cars was more imperative under prevailing conditions than at any other time.

The great need of every kind of transportation facility is the crux of Col. Colt's statement, which is as follows:

"I have had occasion to examine the facts in relation to transportation to see how our company could be of greater service in the national business of carrying on the war. The nation's transportation facilities may be bettered or made more complex by the degree of cooperation between corporations and between individuals in knowing and solving their own transportation problems promptly and intelligently.

"In analyzing our transportation facilities it is evident that everything on wheels must be used and mobilized second to the railroads. As an adjunct and supplementary to them in collecting and distributing merchandise is the automobile. I was surprised to find that in all probability not more than 10 per cent. of the tires sold by all the rubber companies are of the class using the more expensive and so-called pleasure type of vehicle; further, that 70 per cent. of all the automo-

biles now registered are in the hands of owners in the great West and the West beyond Buffalo. Individual owners and companies are operating not only their commercial cars, but those of the touring type to assist merchants and railroads in the transportation of merchandise throughout the entire country. This is particularly noticeable to anyone who has occasion to travel any part of the country at this time by motor car.

By All Means Use Your Car.

"Use your car, both passenger and commercial, more and more to relieve the transportation pressure on the railroads and merchants' delivery service. There need be no restriction on the legitimate use of motors or automobiles rendering this magnificent service, loyal service, second only to the railroads, to our government at this time."

With this unprecedented demand for haulage and transportation facilities it is doubtful if the supply of commercial vehicles will be large enough to meet the needs of the country, although it is estimated that there will be an increase of from 50 to 75 per cent. in production during the coming year. As has been the case in England, thousands of passenger cars will be converted into business vehicles, but this movement in this country will be on a greatly enlarged scale as compared with that abroad. Used cars with any service value at all will find a ready market for conversion purposes and the prices will undoubtedly advance.

Brings Decisive Change in Selling Angle.

Classifying the passenger car as a "non essential," however, has not been without beneficial effects on the industry and trade as a whole, as it has corrected some evils in merchandising methods that will do a lasting good. This phase of the consequences is conspicuously shown in a recent placard sent out to the trade by the Chevrolet Motor Co., which said:

Exit Pleasure Car; Enter "Quick Transportation."

"Stop it now! Stop saying 'pleasure' car! The word is out of place in war time. But it was always out of place.

"Study conditions as they are today, not as they were last year. The selling atmosphere is different.

"Talk and sell quick transportation."

"The demand for automobiles has increased, but the reasons for buying are not the same."

"There are new appeals. The selling angle has changed from the frivolous to the serious. Talk the language of the day.

"Sell transportation as it applies to present needs. Point out reasons for buying now.

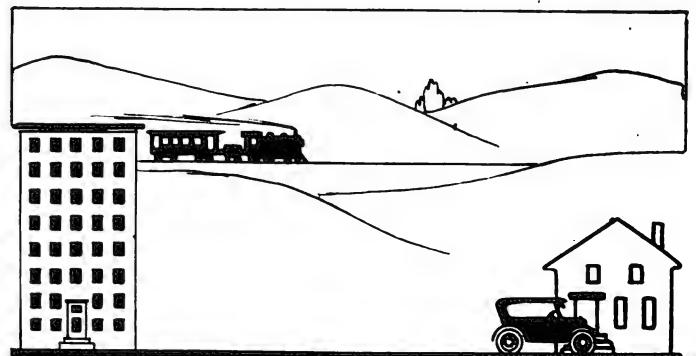
"The pulse of the nation has quickened. Rapid and economical transportation is needed to keep pace with that quickened pulse, and the automobile is a necessity everywhere.

"Let your selling talk be pertinent to present day requirements.

"Sell 'more time'—that's what is given to the man who uses an automobile. Days become longer to him; his range of activity increases.

"Sell 'saving energy'—that's what a man does when he uses an automobile. He does not tire as quickly and he is able to do more. He is kept fresh.

"Sell 'more business'—'more activity'—that's what a man



In Commuting Distances the Car Has Many Advantages and Saves Much Time.

is sure of with the use of a motor car. He is able to accomplish more. Don't think that the demand is less—it is greater—but the reasons for buying have changed.

"You must understand and interpret these new reasons properly. Awaken in each prospect the present day possibilities with the aid of an automobile."

Save Fuel; Use the Car; Keep Good Health.

Still another instance of the position of the motor car in the economic welfare of the country was cited by Alfred Reeves, General Manager of the National Automobile Chamber of Commerce, in a statement issued by the organization.

"Automobilists," said Mr. Reeves, "are keen to help the government and are co-operating to avoid waste of fuel. People must use cars and more than 40 per cent. of our 4,000,000 cars are used strictly for business purposes, with a big percentage of the balance of passenger cars used in some degree for utility purposes. It is very hard to draw the line where utility with an automobile ends and so-called pleasure riding begins. President Wilson's form of relaxation from governmental cares is an automobile ride every afternoon—a necessity for his continued good health.

The cry of "non essential" against the motor car is more anomalous at this time than at any other time in the history of its development, as the call across the land is for more transportation facilities and means of relieving the congestion on the railroads. What else can fit in this widening gap in the economic conduct of the country's business if it is not the motor car. There will not be enough trucks to meet the emergency, a fact which has already been recognized by some of the largest concerns in the motor industry, who have plans well along toward completion for a gigantic scheme of employing all classes of motor cars to take up the burden of transportation requirements. The B. F. Goodrich Co. of Akron, O., has started a campaign along these lines on a comprehensive scale and in keeping with the government's "Farmer to consumer plan."

Importance in Garnering Food.

The Goodrich National Touring Bureau, cooperating with automobile clubs throughout the United States, is preparing to launch a campaign next year to bring the motorist in closer touch with the farmer, so as to enable him to purchase necessities direct from the fields without freight delays and at reduced cost.

The government for a long while has been attempting to promote and stimulate a scheme whereby foodstuffs can be brought direct from the farms to the consumer without entailing delays that might be disastrous to the shipment and Congress is being asked to sanction an automobile and motor truck collection system which would relieve the railroads, including the establishment of service bureaus in cities for the benefit of the man with an automobile at his disposal.

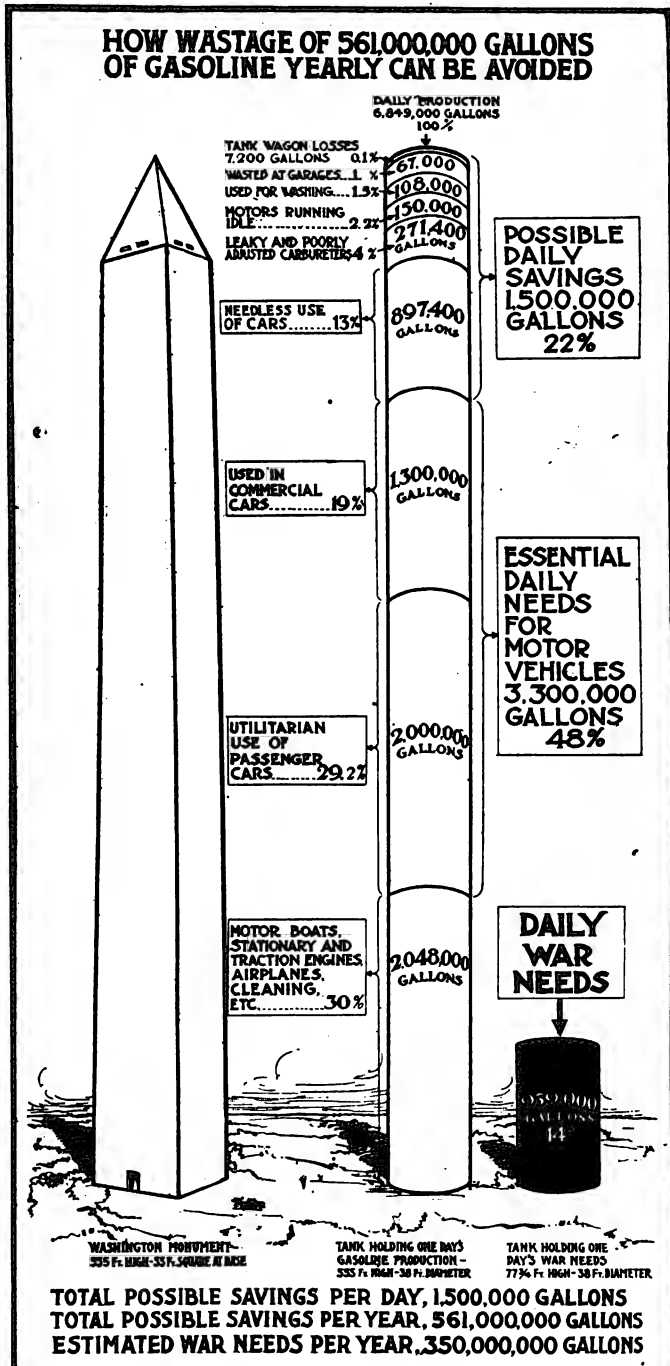
With such systems in operation there would be no motor cars that could be classed solely as pleasure vehicles, except possibly a scattering few, but it is also true that thousands of people still use the railroads for pleasure tours, a fact, however, which does not call for suppressing the passenger coach.

Another outlet and market for used cars has already developed, which promises to be very extensive in its effect on prices. New York dealers in used cars are exporting them to Japan and the South Sea Islands, where they sell for three to four times what they bring here. These cars are thoroughly overhauled before being shipped and are found perfectly satisfactory by the purchasers. One New York dealer is reported to have exported 100 used cars to Japan and another shipment of 20 to Java is reported.

It is also reported from New York that some of the used car dealers are making no urgent effort to dispose of their stocks, but are storing them in anticipation of the higher prices which they confidently expect to obtain in the spring.

N. A. C. C. SUGGESTIONS TO SAVE GASOLINE.

1. Store gasoline in underground steel tanks. Use wheeled steel tanks with measuring pump and hose. They prevent loss by fire, evaporation and spilling.
2. Don't spill or expose gasoline to air—it evaporates rapidly and is dangerous.
3. Don't use gasoline for cleaning and washing—use kero-



sene or other materials to cut grease.

4. Stop all gasoline leakages. Form habit of shutting off gas at tank or feed pipe.
5. Adjust brake bands so they do not drag. See that all bearings run freely.
6. Don't let engine run when car is standing. It is good for starter battery to be used frequently.
7. Have carburetors adjusted at service stations of carburetor or automobile companies—they will make ordinary adjustments without charge.
8. Keep needle valve clean and adjust carburetor (while engine is hot) to use as lean mixture as possible. A rich mixture fouls the engine and is wasteful.
9. Pre-heat air entering carburetor and keep radiator covered in cold weather—this will insure better vaporization.
10. See that spark is timed correctly with engine and drive with spark fully advanced—a late spark increases gas consumption.
11. Have a hot spark, keep plugs clean and spark points properly adjusted.
12. Avoid high speed. The average car is most economical at 15 to 25 miles an hour.
13. Don't accelerate and stop quickly—it wastes gas and wears out tires. Stop engine and coast long hills.
14. Cut down aimless and needless use of cars. Do a number of errands in one trip.
15. Know your mileage per gallon. Fill tank full and divide odometer mileage by gallons consumed.



Scene in the Show Room of Wetmore-Quinn, Detroit, Mich., Paige Distributors, Hiding a Car with Camouflage.

Unique Display Made of Car Camouflage

WETMORE-QUINN, Paige distributors at Detroit, employed a novel but timely idea in a display recently which attracted attention throughout the city and brought thousands of people into their show rooms on Jefferson avenue.

A Paige was used in a camouflage setting, the car being placed in front of a scene painted to represent a countryside in autumn with a lake in the distance, a cliff at the right and a tree and a stone wall in the left foreground. Part of the car's body was painted like a stone wall and the artist carried the trunk of the tree down the side of the car so that from a short distance away the tree seems to rise from the ground in front of the wall. Leaves and brambles piled about the car completed the illusion so that the presence of the car in the set-

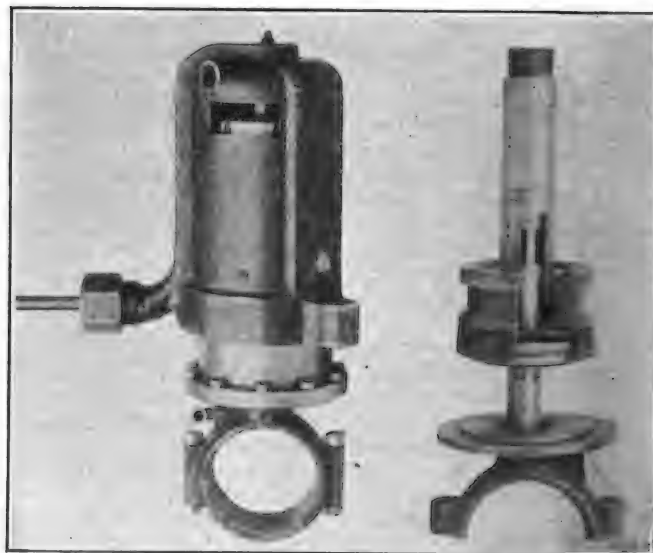
Device to Replace Springs

FORECASTING a day of motor cars that will be springless, a large springless suspension enterprise is being inaugurated in Detroit by the Air-O-Flex Automobile Corporation. This company is incorporated under the laws of Delaware with a capital of \$2,500,000 and will first manufacture commercial cars using the Air-O-Flex suspension, which is said to incorporate the qualities of both pneumatic and hydraulic suspension.

Resembling in appearance some of the pneumatic shock absorbers, the Air-O-Flex cylinders carry the load on a resilient cushion of contracting and expanding body of air and oil and rapidity of telescopic action is obtained by pressure and vacuum in combination. It is claimed that the cylinders afford equal resiliency whether the vehicles are light or loaded, and that with these replacing springs the suspension can be regulated to the weight of the load carried. The housing of the cylinders are mounted on the chassis frame on trunnions pivotally connected with heavy brackets above the axles and the pistons attach to the axles with ball and socket connections. The

cylinders are each connected by piping with a central tank 30 inches long and six inches in diameter, which is one-third filled with engine oil, and pressure is automatically maintained in the tank by an air compressor driven by the engine. The excess pressure on any one or number of the cylinders is equalized in the others by the tank pressure, and as there is no deflection and reflection, as with springs, the load is maintained in an approximate place without vibratory stresses being communicated to the car.

Later the company purposes to manufacture Air-O-Flex suspension equipment for other vehicle manufacturers, including the builders of street and railroad cars.



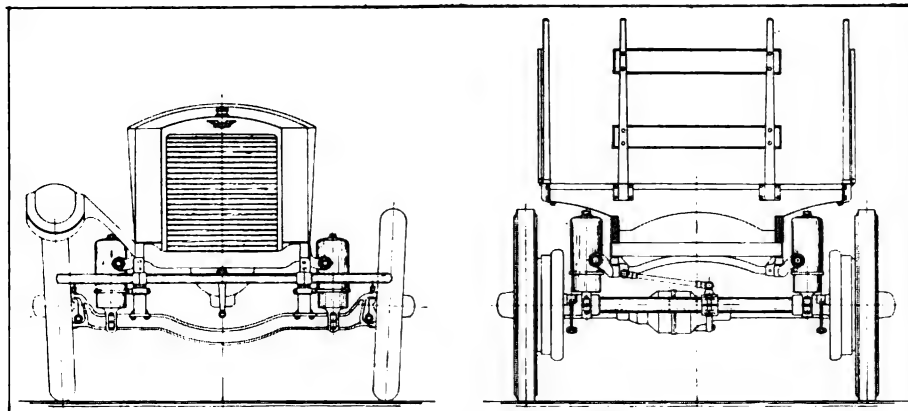
Air-O-Flex Suspension Cylinder with Axle Universal Joint and the Piston Partly Disassembled.

ting could not be detected at a distance of 40 feet from it.

WORKING WITH GOVERNMENT.

The Automobile Industries Committee, which is composed of Chairman A. W. Copland, Hugh Chalmers and John R. Lee, has started the work of active co-operation with the government, the first meeting being held on Nov. 14, when Mr. Copland pledged the men, material and equipment of 550 automobile plants and 1080 parts and accessory manufacturers to war needs.

It is planned to distribute the munitions work among the manufacturers in such a way that while some curtailment will necessarily result, it will go into effect so that the 27,000 retail dealers in the country will not feel the change. The committee has opened headquarters in the Second National Bank building, 509 Seventh St., N. W., Washington, D. C.



At Left, Front of Car Showing Manner of Suspending the Chassis Frame on Air-O-Flex Cylinders. At Right, Rear View, Showing the Manner of Installing and the Cross Radius Rods.

Cross-Country Cruise on a Denby Chassis

"A sailor's life is the life for me,
"And a home on the rolling deep."

ONCE a man gets his sea legs well rigged his distaste for terra firma is such that traveling by railroad is so monotonous it becomes unendurable. This, the sentiment of the true yachtsman, probably inspired Robert E. Magner, former commodore of the Seattle Yacht Club, to construct a land going cruiser in which he crossed the continent from Boston to his home on the Pacific coast, accompanied by his mother, 76 years of age, enjoying all the comforts that are to be found in the sizeable cabin of a fair sized yacht.

While on a visit to the East last summer Mr Magner and his party, which in-



Ice Box, Cabinets, Sleeping Berths, Gas Stove and Other Interior Details of the Denby Continent Cruiser.

cluded his mother and sister, hit upon the novel idea of having an autocruiser built in which they would tour back to the coast in leisure runs over the Lincoln Highway and then north along the Pacific Highway to Seattle. In selecting a hull for their cruiser they purchased a model 12 Denby chassis. The remainder of the craft was constructed from a special design and specifications furnished by Mr. Magner, and included a long and wide express type of body with extra high sides, standing top with side and rear curtains and a deep bowed bonnet curving out over the windshield. Curtains were also provided so that the entire body back of the dash could be enclosed, and the driver's seat was extended out so that four people could ride abreast with comfort. An electric starting and lighting system was installed and pneumatic tires substituted for solid



The Denby Continent Cruiser, a 1917 Land Yacht Designed and Equipped for Touring by Robert E. Magner.

ones common to commercial car chassis.

Entrance to the cabin, instead of down the gangway as per yacht fashion, is through a door in the rear, reached by a pair of steps that can be either left attached or removed for traveling. The interior is arranged with the same consideration for room and comfort that is necessary on a boat. Back of the driver's seat is a series of berths that fold and one or more can be dropped to form a lounge. A spacious cupboard provides storage for the dishes, silver and food. Other equipment includes an ice box with capacity of 50 pounds of ice, a sink with running water, a dresser, an acetylene stove, a folding table, four folding chairs and a folding bath tub. Two 100 foot Prest-O-Lite gas tanks supply fuel

for lighting the interior and the stove and a 60-gallon gasoline tank and 40 gallon water tank carry the extra fuel and supply for the toilet requirements, so that the car could be driven up to 500 miles without replenishing the supplies.

In fair weather or foul the cruiser can proceed with maximum comfort afforded the occupants, as the side curtains can be raised for ventilation or closed. The cruiser left the port of Boston on Sept. 4, bound for San Francisco, via the Lincoln Highway. From that port it was the intention of the party to go south over the Pacific Highway to San Diego and thence turn north again from the Mexico border to the Canadian border.

On the panel of the driver's seat the name "Autocruiser" was painted and on the side and the body, "Lincoln Pacific Highways," with the main points to be

touched on the itinerary in smaller letters at the four corners. Some day, maybe, the log of the "autocruiser" will be printed and if so it should prove interesting to the motoring yachtsmen.

NEW AIR COOLED CAR.

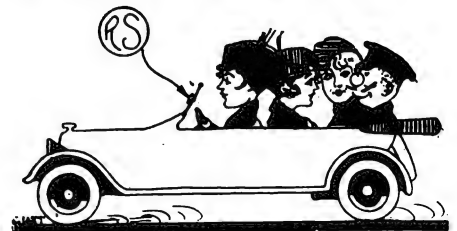
The Holmes Automobile Co., Canton, O., which was formed last January to market a new air cooled passenger car, expects to have its new models on the market in the near future and is now arranging for a distribution organization.

BRIDGETON, N. J., ANNUAL AUTOMOBILE SHOW DATES.

The Bridgeton Auto Dealers' Association of Bridgeton, N. J., will hold its annual automobile show during the week of Jan. 26 to Feb. 2 inclusive. It will be the largest exhibition of cars and accessories ever held in South Jersey and the association is planning to make it the occasion of an assembly for the betterment of the business in general. Joseph Acton is president of the association and O. P. Riley is secretary and treasurer.

RIDES FOR RETURNED HEROES.

Car rides for the returned soldier is one way of expressing their appreciation quite prevalent among motorists in Canada. The Winnipeg Automobile Club has issued a khaki colored emblem,



which, when slipped between the windshield, indicates there is a seat available for a soldier to occupy. This kindly practise is also spreading this side of the border, it is pleasing to note.

Doughty Tires Track Tested

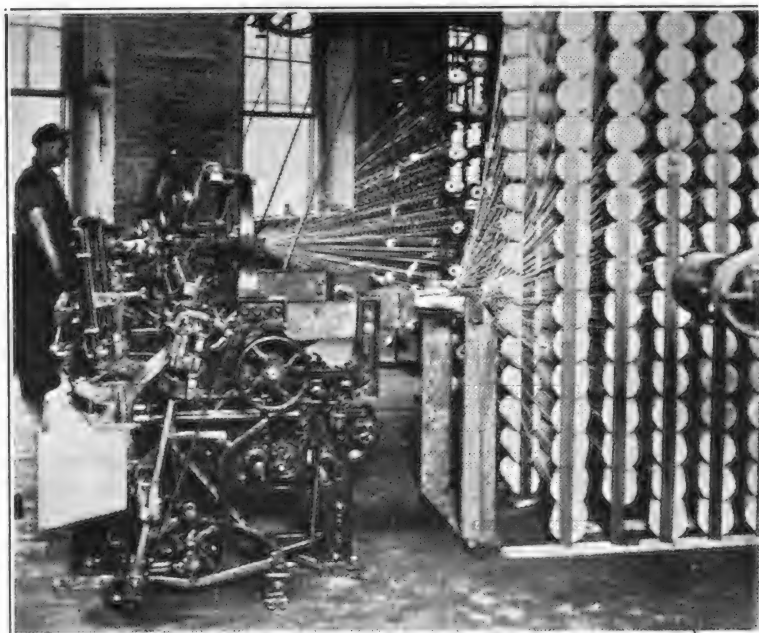
Shoes Driven 100 Miles in 97 Minutes at Narragansett Speedway Show Comparatively Little Wear

In Making Fabric Is Woven in Shape of Tread, Wound on Cores in Single Pieces, Having Uniform Tension and Great Strength

PRODUCED by machines and by methods covered by patents issued to Henry J. Doughty, the Doughty Tire Co., Providence, R. I., is manufacturing pneumatic shoes for automobile vehicles that are claimed to have qualities not found in other tires of the same type, these making for endurance and long service, while the manufacturing cost and consequent selling prices are considerably lessened through economies that are peculiar to the process. The claim of

threads of the fabric to loosen and probably become entirely free in places in the structure, greatly reducing its strength and eventually resulting in bursting from inflation pressure.

Internal friction, according to the manufacturer of Doughty tires, results largely from the variance of tension of tire fabric. When made from woven flat fabric the threads that had originally no stresses upon them are stressed to varying degrees in shaping the fabric upon the



Weaving the Fabric for Doughty Tires on Special Loom That Shapes the U Form for the Treads Automatically.

the company is that the shoes it produces have greater strength than tires of similar sizes, because the construction is such that when driven internal friction is minimized and deterioration from actual wear much reduced.

Internal friction from distortion of rubber compound under pressure is not comprehended in the statement, which is applied to wear of tire fabric from the flexing of the tube and casing under driving stresses, which in time causes some

core, a condition that obtains no matter whether made by hand or machine. The fabric is drawn tightly on the core and held by the rubber with which it is "frictioned." Under inflation pressure these stresses are intensified and when the tire is flexed from driving, particularly at high speeds, the alternations of tension eventually cause the threads most tightly tensed to break from anchorage, wholly or in part.

Fabric in tires made by other than

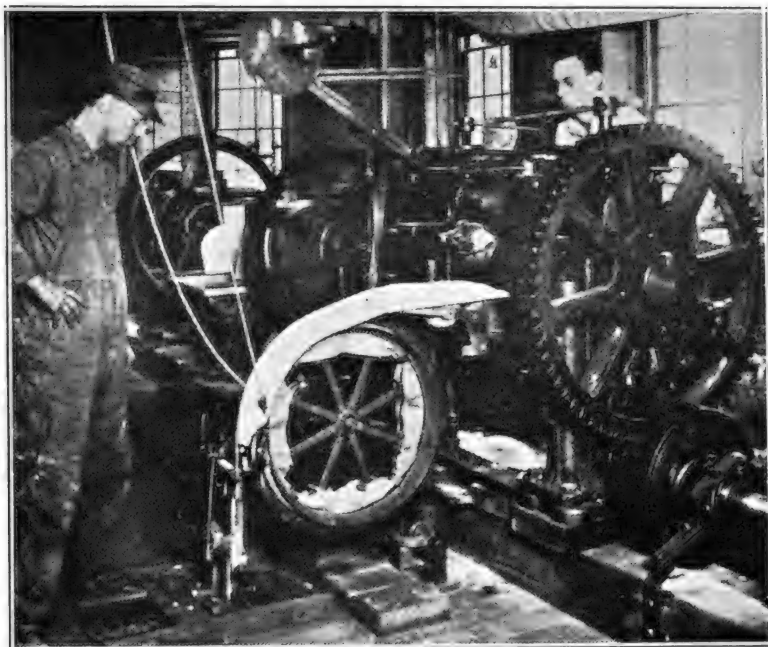
the Doughty process is cut bias, so that the threads are placed diagonal to the circumferential centre line. The fabric is put on in layers or plies, a certain number for each size tire, which are consolidated by a thin coating of rubber on one side of each ply to form the carcass. In the curing the plies are firmly united by the rubber becoming semi-fluid from heat and filling the voids of the fabric.

This explanation of conventional tire construction is necessary to inform the reader wherein the Doughty process differs from it. The Doughty tire is what is known as a single piece carcass type. The fabric of the carcass is one piece, instead of a number of pieces, which is claimed to be stronger than were it built of sections. This statement does not consider the adhesion of the plies when consolidated in curing, which is practically the same with all pneumatic tires.

When tire casings are built by other processes the plies are short lengths of fabric, put on with the edges lapped, stretched from one side of the core to the other, either by hand or machine. The tension of the fabric is variable because it must be laid smoothly and the diameter is considerably greater at the tread than at the beads or edges. Originally all tires were built by hand. Then machines were utilized for two reasons, the one that the labor economy was considerable, and the other that the tension upon the fabric is uniform at all times, which is not practically obtainable with hand work. But this machine tension, while constant on the fabric, does not so place the fabric on all parts of the carcass that the tension upon all threads is alike.

As the carcass has largest diameter at the tread the fabric is under greatest tension at the tread when applied, and as the diameter is smallest at the beads the tension is lessened considerably because practically the same area of fabric must be used on a smaller surface area. When in service the weight upon the tire causes the side walls to bend or flex to a far greater degree than the tread and the stresses are continuous, depending to some extent upon the inflation pressure.

The Doughty tire is constructed to an entirely different principle—to the theory that the carcass will



Taking the Frictioned Fabric Direct from the Calender and Making the Carcass of a Single Piece Wound Longitudinally.

have greatest strength if the fabric is placed longitudinally around the core in the same manner one would wind a tape around a disc, so there is no lapping of sections, the warp or longitudinal threads being continuous for the number of layers or or transverse threads extending turns of fabric applied, and the woof from one side to the other. Were the fabric woven flat there would be unequal tension at the beads of the carcass, so the fabric is woven on special looms, flat at the edges and curved in the middle section to a close approximation of the form that it will have when wound on the core. The fabric when placed on the core has practically a uniform tension longitudinally and transversely, and when the tire is built the stresses from flexing are practically the same throughout. The fabric can be woven at any desired width and thickness. Of course the production of the fabric is a special process. The loom is built expressly for this work and it is unique in that the yarn is taken direct from a series of spools, obviating the need of slashers and beamers for producing the warp.

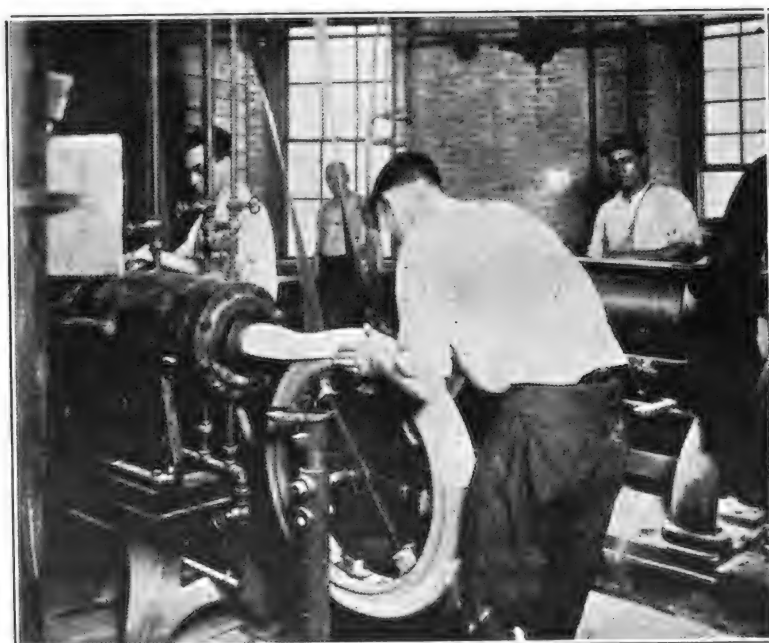
The fabric is woven in pieces that may be any desired length, so that there is a considerable gain with reference to labor and waste. Sections are cut and placed in friction, calendering machines, the rolls of which are shaped so that when the

fabric is run through them the centre is formed into a U shape that conforms roughly to the largest diameter of the tire across the tread from about the middle of one side wall to the other. In other words, the calendering machines form in the fabric what is the tread of the tire.

The fabric comes from the calenders directly on to the wooden cores on which the tires are built, the claim being that by using the fabric as it is frictioned a much better adhesion is obtained. In building the 30 by 3½ inch tires four complete

winds of fabric are placed around the cores, a thin sheet of rubber being wound between the layers or plies. The beads of the tire, which are made separately, are applied after two revolutions of the core. Then two shaping wheels, one at either side, press the fabric over the beads and against the core, forming the carcass with the one operation, there being a finishing strip at either side, which protects the edges of the fabric. The claim is made that the carcass is formed so that it has the shape it will assume when loaded, so that when inflated and under pressure it is not distorted and the stresses upon the tire are not abnormal. Because of this construction the tire is claimed to have unusually long life and endurance.

When the fabric has been applied and cut the carcass is taken, still on the wooden core, to the tubing machine. From this a section of rubber that covers the carcass is forced under pressure and in the shape of a heavy ribbon is hand fitted around it, covering the tread and the side walls to the beads. The ends of the ribbon are cut and butted and then the shoe is ready for the vulcanizing. The wooden core is replaced by an iron core in eight sections that is heated by electricity and is not removed from the vulcanizer. The core is in two groups of four sections each when the vulcanizer is open. As the machine is closed the



Putting on the Tread and Side Walls from the Forming Machine, the Third Operation of the Doughty Tire Making Process.

eight sections are expanded against the three outer sections of the mould, which are heated by steam.

The main or centre section of the mould conforms to the tread and the upper and lower sections to the sides and beads. After the core and the mould have been heated their temperature is unchanged while the machine is in use. The time of the cure varies from 10 to 20 minutes, so there is considerable time saved over a process that requires heating the moulds for each tire cured.

The output of the factory, now from 30 to 40 tires a day, is limited by the capacity of the vulcanizing machine, but with another vulcan-

izer the production can be doubled without increasing the working force. One of the three looms is used, but all will be operated when a second vulcanizer is installed.

Putting the Tires Into the Vulcanizing or Curing Machine, Which Is Continuously Heated by Steam and Electricity.

At the turns was more pronounced than were it heavier.

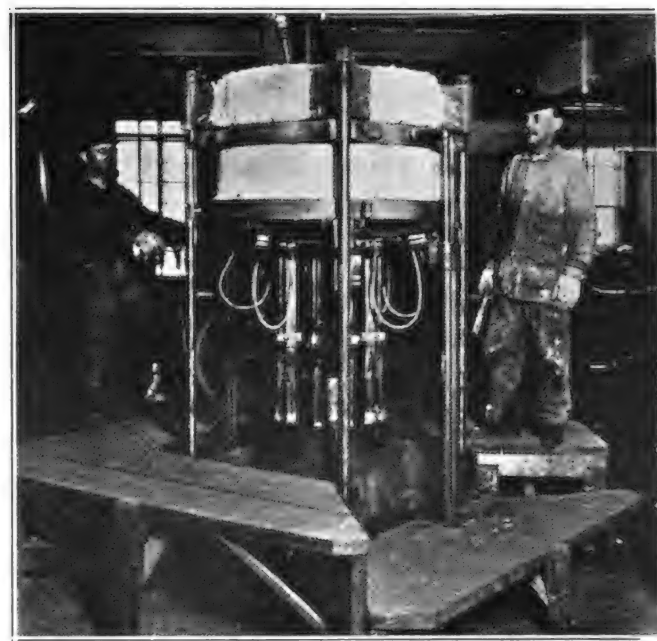
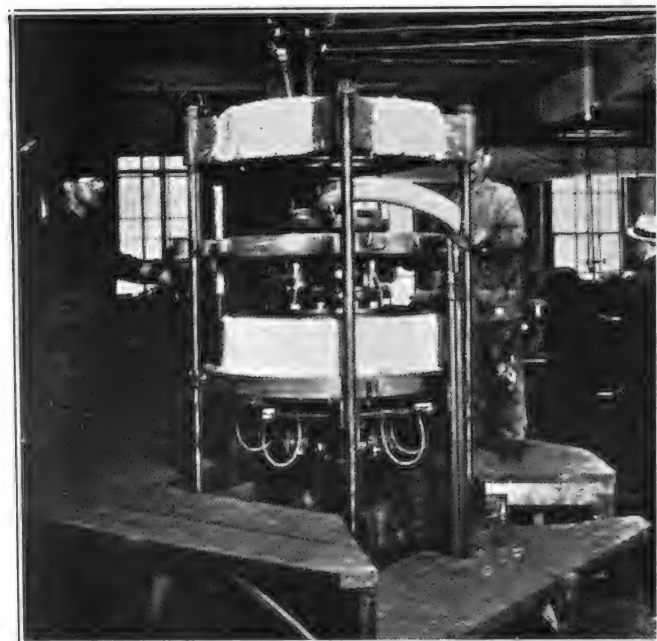
In this test, witnessed by officers of the tire company and a representative of the Automobile Journal, the first four miles were driven an average under 40 miles an hour. Speed was increased as the engine heated and a 54 mile average was maintained until the ninth mile, when a broken valve caused a tire to deflate. The car was driven a mile and a half with the shoe flat before the tube could be replaced, the same casing being used. The machine was then driven 68 miles in 63 minutes, stopped 50 seconds to repair a speedometer shaft, and driven 32 miles more, the total distance after replacing the right front

NEW FORD CARBURETOR.

The Wheeler & Schebler Co., Indianapolis, Ind., is modeling a new model A carburetor equipment for Ford cars, which sells complete for \$17. It has only two adjustments, one for slow speed and one for high. The carburetor, steering column control, hot air drum, flexible tubing, manifold gasket and the necessary screws and bolts for installation are included in the equipment.

DAYTON CO. GETS LICENSE.

The Wire Wheel Corporation of America, Buffalo, N. Y., has granted a license under its basic patents to the Dayton Wire Wheel Co. of



The Vulcanizing Press with the Mould Containing a Shoe Curing, This Being Final Operation of Doughty Process.

shoe being 100 miles and the time 97 minutes.

Examination of the shoes showed temperatures comparatively low and no signs of wear or breakage of the fabric. The treads on the right or outside wheels of the car were worn to the fabric, but the front tire, though driven a mile and a half with a valve inside the shoe, was not damaged. The cement track surface, while affording excellent traction, was rasp like in its effect. The treads of the shoes showing diagonal cuts across the surfaces from skidding. The wear, however, was less than expected and the tire makers expressed themselves as extremely well satisfied with the test.

Dayton, O., to manufacture wire wheels for motorcycles, aeroplanes and Ford automobiles. This corporation succeeded to the business of the Houk Manufacturing Co. The Standard Roller Bearing Co. of Philadelphia, Pa., and the Hayes Wheel Co. of Jackson, Mich., are also operating under licenses covering these same patents.

At the meeting of the Society of Automotive Engineers, Metropolitan section, to be held in New York, Nov. 22, W. D. Deppe will read a paper entitled, "Solving the Gasoline Problem."

PAPER ON GASOLINE.

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FAMOUS JUDGE ADVOCATES FOOL PROOF TRAFFIC LAW.

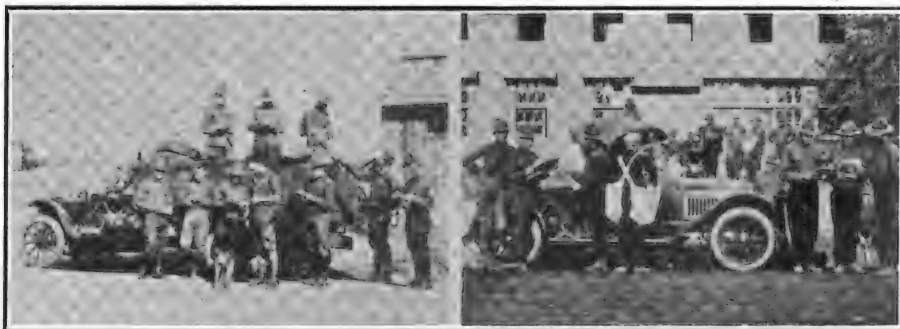
The Motor Truck Club of America at its dinner at the Automobile Club of America had as its principal guest Magistrate Frederick B. House of the Traffic Court of the city of New York, who has imposed sentence on more violators of traffic ordinances than any other judge in the world.

He spoke freely on the traffic law in its relation to both pedestrian and motorist and characterized some of its provisions as being "utterly foolish," particularly the one providing that a car must not exceed a speed of four miles an hour in rounding a corner. He stated that the law was based on the fundamental principle that everyone has a right to the "full length and breadth of the highway," and that it was framed for the equal protection of pedestrian and motorist alike.

He said he was opposed to the establishment of a traffic commission, as it had been his experience for years that the men who sit on these commissions are those who know the least about traffic conditions. If there are three men there will be three opinions. If there are five men there will be five opinions. And if only one man is appointed he will be working at arm's length with the police, and without cooperation with the police nothing can be satisfactorily done.

"Somewhere there is a man who knows traffic well, who knows the rights of all users of the streets and who knows the needs of the city of New York. If you gentlemen had influence enough to select that man and appoint him commissioner I am sure it would be a good deed."

When questioned as to the problem of tampering with cars and car thefts, in the discussion that followed his address, he said he did not think that locks were a solution and that the carrying of an extra man was out of the question. He declared leaving cars in the streets an evil in itself.



Scenes at Camp Dodge, Iowa: Left, Arrival of the Mail; Right, White Roadster Delivering the "Camp Dodger," the Camp's Weekly Newspaper.

CARS OF PEACE AND WAR AT CAMPS

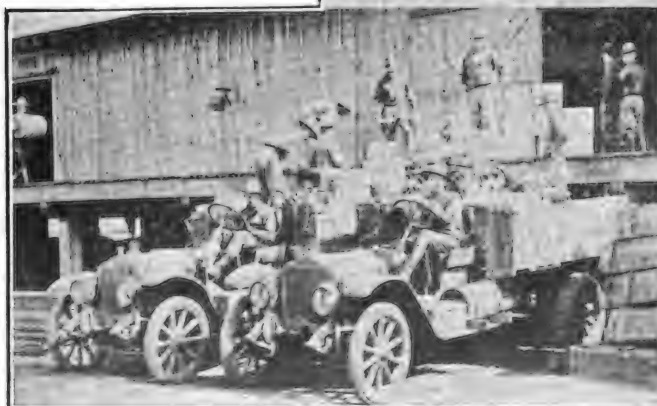
Motor Vehicles Essential to Mobilization, Daily Life and Subsistence of the Great National Army

THOUSANDS of people have visited the great army cantonments, where their sons, brothers or relatives are in training to down the Kaiser, but those that have never witnessed the intensive activities going on at these great camps where the American youth becomes the soldier, could hardly realize how much duty falls on the peaceful motor car in its new realm of operation.

Both the passenger cars and the trucks are to all appearances the same type that chugged through the streets of the cities, but are bent on different errands

and work, and once witnessing their activities it is difficult to realize how armies were ever mobilized in the old times without their aid. They not only serve in the many capacities in which the horse formerly held sway, as supply carriers, in gun haulage, dispatch delivery and other work, but it was through their use that the quick construction of the cantonments were made possible.

Before these soldier cities came into existence the sites on which they were located were in most every case either barren or wooded sections of the country, needing clearing and leveling. They were so located also that new roads had to be built to haul material for their construction, calling for the use of thousands of tons of various materials. Most of this enormous work was performed through the agency of the motor truck and since their completion most of the maintenance is accomplished through the motor truck, while the thousand and one duties requiring transportation of persons and messages is handled by touring cars, roadsters and



Above, Delivering a Two-Ton Load of Groceries at a Barrack Kitchen at Camp Funston; Left, Unloading Trucks Freight with Miscellaneous Stores at a Post Warehouse; Right, Delivering Bags of Potatoes at a Regimental Storehouse.



Extremes of Training at a U. S. Naval Station: Left, "Prisoners" Working on the Sanitation Truck; Right, Jackies on Leave Off for a Spin.

motorcycles, as well as trucks fitted with special bodies.

Camp Funston, located west of Topeka, Kan., is on a reservation covering 31½ square miles of territory. This is the largest of the cantonments and typical of all. Already it has more than 4000 buildings, with ample quarters for the training of 60,000 men. A veritable army of workers set up these camps, some 10,000 men being engaged in the work which required thousands of loads of material, all of which was dumped at the railroad sidings and hauled to the camp by motor trucks. Two United States army trucks were used in the latter work in addition to a fleet of 42 White trucks sent from the factory at Cleveland. In all some 100 machines were used in the work.

As soon as the big camp began to take on completed form many trucks were necessary to replenish the regimental store houses from the long train loads of supplies that were constantly drawing up to the railroad sidings, others were used in road construction and still others in the sanitation corps, an enormous task in itself, over 21 miles being built, and the various departments where transportation of material or men is required.

Officers' cars, mail cars, dispatch cars and hundreds of touring cars that come to the camps with visitors, speckle the newly made roads, making a scene like that witnessed at a great motor car meet. Everything at the camps moves on motor cars, supplies, men and visi-

tors. Some idea of the enormous haulage task in foodstuffs and materials alone is shown in a table compiled from figures by the White Co. of Cleveland, O., detailing the quantities of food stuffs and supplies hauled by a fleet of over 100 White army trucks at Camp Funston, Kan. Officers say these amounts are only sufficient to feed and care for 50,000 soldiers for a period of 30 days:

Commodity	Pounds	Commodity	Pounds
Flour	1,500,000	Laundry soap	172,000
Bacon	270,000	Sugar	352,000
Beans	150,000	Salt	82,000
Potatoes	1,500,000	Rice	74,000
Fresh mut- ton	100,000	Hard bread	80,000
Fresh beef	1,400,000	Rock salt	3,000
Coffee	101,000	Butter	60,000
Tea	18,000	Onions	254,000
Ice	5,000,000	Fruits	44,000
Candles	34,000	Lard	21,000
		Prunes	50,000
Commodity	Cans	Commodity	Cans
Evaporated milk (pints)	73,760	Blackberry jam	50,720
Black pepper	17,000	Ginger	1,644
Tomatoes	27,880	Baking powder	8,505
Peas	90,000		
Commodity	Gallons	Commodity	Gallons
Vinegar	5,400	Pickles	4,000
Syrup	15,720		
Commodity	Packages	Commodity	Packages
Tobacco	128,000	Towels (sin- gle)	100,000
Toilet soap (cakes) ...	50,000		

Freight car loads of construction materials, including 26,000,000 feet of lumber, hauled by White trucks in the building of Camp Funston, Kan., to a date in October:

Material	Cars	Material	Cars
Machinery	17	Radiators	52
Baking equip- ment	12	Rock	657
Plumbing mate- rial	142	Roofing	57
Sewer pipe	182	Commissary sup- plies	120
Water pipe	185	Electrical sup- plies	60
Coal	27	Boilers and stacks	42
Hardware	22	Redwood tanks and equipment	4
Nails	47	Iron tanks	16
Brick	112	Sashes and doors	57
Gravel	25	Commissary equipment	29
Poles	37	Roofing paper	36
Cord wood	13	Cement	201
Laundry ma- chinery	36	Office supplies	13
Refrigerators ..	21	Wall board	74
Stoves and fur- naces	25	Doors and win- dows	34
Ice machinery ..	12	Miscellaneous ma- terial	281
Machinery	37		
Road builders' supplies	18		

The national army cantonments have occupied more of the limelight than the naval training stations, yet at these there have been activities no less interesting and in large volume. The navy has its war cars as well as the army. In all the camps and stations the motor vehicle proves its essentiality day in and day out, no less than in the civil life which the fighters have temporarily left behind.

CHARLES G. PERCIVAL GETS CAPTAIN'S COMMISSION.

Dr. Charles G. Percival, advertising manager of the Van Cortland Vehicle Corporation of New York, has been commissioned a captain in the United States Army and will be attached to the Motor Equipment Department of the Ordnance Department.

Dr. Percival is one of the best known motorists in the country and prior to his recent connection with the Van Cortland company, distributors for the Peerless eight-cylinder cars and Peerless trucks, he was motor truck editor of the New York Globe and Commercial Advertiser.



Above, One of the Highways Built in the Reservation at Camp Funston, Kan.; Left, the Stone Crusher Operated by the Government at Parker's Hill; Right, White Truck with Apparatus Used in Tarviating and Oiling the Camp Roads.

Heating Equipment for the Car and Garage

Devices that Overcome the Difficulties of a Chill Climate and Break King Winter's Grip on Motoring

IN THE years gone by motorists in general made a practise of putting up the car with the arrival of the winter season. Every year, however, has increased the number of cars in service and improved the condition of the roads, so that, except in the hardest of snow storms the cars may be used throughout the year.

Accessory manufacturers have realized that there was a big field in winter heating devices for the car, as well as for the garage, and so many devices are manufactured which make the use of a car in winter a practical matter, without the attendant annoyances that low temperatures cause.

Perhaps the greatest difficulty that the winter motorist will encounter will be in connection with starting, due to the high vaporizing point of gasoline. The one thing that will minimize this difficulty is the proper application of heat to the carbureting system. With the car in a heated garage this trouble is negligible, but when the car is left out in the cold great trouble is often experienced in getting the engine started.

CARBURETOR AND MANIFOLD HEATERS.

Ever Good Electric Primer.

The Ever Good Electric Primer is a little device in the shape of a gasket designed to be placed between the carburetor and manifold, and carries a small coil of German silver wire, which is heated by the storage battery or dry cells. The heat generated by the resistance of the wire is utilized in vaporizing the gas in the manifold. This device is sold by Emil Grossman Manufacturing Corporation, Bush Terminal building, New York.



Findeisen & Kropf Hot Air Stove Device.

The Stalit Heating Plug, also a battery heating device, is screwed into the manifold. This device, which is made by Geo. Staats & Co., 74 Bayard St., Brooklyn, N. Y., somewhat resembles a spark plug, but carries a coil of high resistance wire. Against the plug the gasoline passing through the manifold is heated to a vapor, regardless of outside weather conditions.

Electrical carburetor and manifold

heating devices as a rule are designed simply to make the starting of the car easier, and as soon as the engine is thoroughly warmed the electrical current is shut off, for the engine itself once it has been started generates enough heat to vaporize the fuel.

Thorwald's Electric Heater.

Another device which is designed to heat the gasoline in the carburetor is manufactured by the E. H. Sprague Manufacturing Co., 606 S. 14th St., Omaha, Neb., under the name of Thorwald's electric carburetor heater. The



THORWALD'S ELECTRIC Carburetor Heater

device is connected in circuit with a switch and battery and the manufacturers claim that with but little current the fuel in the carburetor may be brought to the boiling point.

Hot Air Carburetor Device.

To give maximum flexibility and efficiency, however, it is necessary to keep the carbureted gasoline in its vaporous form, or it will condense and cause uneven engine action. Findeisen & Kropf Manufacturing Co. of 21st and Rockwell Sts., Chicago, Ill., manufacture a hot air outfit, the principle of which is to heat the air passing into the carburetor. Around the exhaust manifold line is clamped a jacket, termed a hot air stove, from which the warm air is carried to the carburetor intake by a flexible tubing.

HOOD AND RADIATOR COVERS.

Average engines and radiators are designed for ordinary temperatures. As the temperature drops the necessity for large radiating surface is decreased. So to secure maximum efficiency at low atmospheric temperatures the radiators of many cars should be partially covered. To conserve the heat under the hood the hood should also have a protecting cover. Jack Frost Robe.

The Jack Frost Robe made by the J. P. Gordon Co. of Columbus, O., is made in two parts, a jacket with a curtain that completely covers the radiator and a robe to cover the hood. The robe is carefully made from patterns and is said to be a tight fit. The better grade is made



Martin Hood and Radiator Cover.

of artificial leather, the cheaper of enameled cloth. Both grades are lined with a heavy heat retaining material. Styles are made for every American made car and a special one-piece curtain for Ford cars which rolls from the bottom up to avoid interference with the crank.

Simon Combination Device.

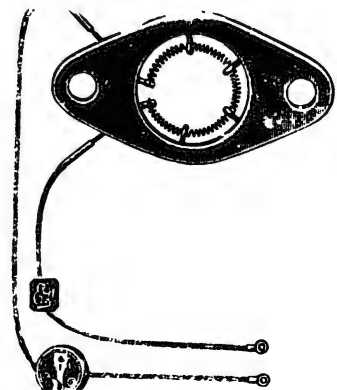
A combination radiator and hood cover is made by S. C. Simon & Co., Brown St., Philadelphia, which is extremely attractive and practical. This cover is made of heavy black drill and may be had with either kersey or felt lining. Two types of covers are made. One is fitted with buckles and designed for both radiator and hood cover; the other, fitted with curtain fasteners, permits the use of the radiator section alone.

Martin Zero King.

The Martin Manufacturing Co. of Lancaster, O., manufacture a combination radiator and hood cover, called the Zero King, which is made of water proof enameled drill and lined with one-ply felt lining. In addition to this line a heavier grade is carried, made of artificial leather lined with felt. All styles are said to be close fitting and attractive in appearance.

ELECTRIC ENGINE HEATERS.

Where the automobile is housed in an unheated garage that is lighted by electricity the problem of heating the manifold or engine is somewhat simplified.



Ever Good Electric Primer.



Consolidated Rust Proof Coil.

A handy little electric heater, designed to be attached to the regular lighting circuit, is made by the Consolidated Car Heating Co. of Albany, N. Y. This device consists of a rust proof coil wound on a heavy porcelain bar, rigidly supported by large mounted insulators at both ends and contained in a heavy perforated steel case. The average consumption of current is about 20 watts and the device may be used on either direct or alternating current. It may be placed beneath the hood and upon the engine, and with the current turned on soon brings the air under the hood to a summer temperature.

Hughes Electric Heater.

A device is being placed on the market by the Hughes Electric Heating Co. of 5660 W. Taylor St., Chicago, Ill. This device is also operated from lighting current and though small in size generates considerable heat. The heating element is enclosed in a black metal shell and is said to consume but a slight amount of current per hour.

Presto Electric Heater.

The Metal Specialties Manufacturing Co., 338 N. Kenzie Ave., Chicago, Ill., have recently put an electric engine heater on the market which is extremely compact and practical. This device measures but 12 inches in length and may be hung under the engine hood, connected with the garage lighting circuit and turned on. The heating units are

coils of wire wound on special insulated rods all enclosed in a perforated metal case.

The Elektroford.

For Ford cars, the Elektroford engine heater has been designed. This device is manufactured by the D. C. Hughes & Co. of 4642-44 Ravenswood Ave., Chicago, Ill., and is attached to the water intake header. When the electrical connection is made with the garage lighting system the water in the cooling system is quickly warmed and the engine brought to a good operating heat.

GARAGE HEATING DEVICES.

Many owners prefer to keep the garage itself heated rather than simply the car or engine, and for that purpose either coal or gas may be used. The W. A. Schlett Manufacturing Co., Inc. of Syracuse, N. Y., are putting a hot water system on the market called the "Wasco." This system consists of a coal stove and a radiating system.

Description of Wasco.

The coal stove is really a well designed small boiler, for it is water jacketed from the fire box to the top. This water jacket is fitted with two connections to the radiating system and with an expansion tank which is designed to regulate the temperature of the water.

Inside the tank is fitted an air tight float, which is connected through regulator rods with a griddle damper in the chimney. As the water in the radiating system reaches a predetermined temperature its expansion in volume raises the float in the expansion tank and closes the damper. As the water is cooled and contracts the lowering of the float opens the griddle damper and the increased draught causes the fire in the stove to increase.

The radiating system is of the unit form, each radiator measuring 13 inches by seven feet three inches. It is designed for heating one automobile space, more units being added for larger installations.

It is said that the system consumes but very little coal, as for a one car system, one scuttle of coal daily will suffice. Because of the automatic regulating device temperature the system requires but very little attention. The installation



Presto Electric Heater.

is simple, as all joints are made up to specifications at the factory and fitted, nothing is required but assembling in the garage.

The system is flexible and the radiators may be connected in practically any formation, the heater in the garage, in the cellar, or in a special room at the side; the radiators on a level with the heater or on the floor above. The only change required is the placing of the expansion tank and automatic regulator above the highest radiator.

Scientific Safety Heater.

For those who might prefer a gas heater to a coal stove or water system, the Scientific Safety Garage Heater, made by the Scientific Heater Co., 1065 East 152nd St., Cleveland, O., has been designed.

The Scientific heater may be operated from either natural or manufactured gas at lighting pressure. The heater is made in two parts, an inner sheet iron fire box, which is fitted with a double perforated screen at the bottom and has a vent for carrying off the products of combustion and a heavy outer galvanized casing.

The combustion takes place at one end of the inner chamber, or heating drum, in a combustion chamber that is heavily lined with cast iron plates. After combustion the burned gases circulate through the drum and escape through the vent pipe into the garage, or they may be carried by additional piping to the outside.

To the front of the two casings is clamped a heavy cast iron front which carries the burners and other devices. When installed the heater is practically flame tight, and access to the interior cannot be had except by disconnecting the gas main union and removing the



Application of Three Types of Perfection Motor Car Heaters.

**Carbon Brick Heater.**

cast iron front. The main burners are lighted from a pilot light, which is said to consume about 25 cents worth of gas per month. The pilot is lighted by a special ratchet and flint arrangement from the outside, doing away with the necessity of using matches or any other form of naked flame, though in case of damage to the lighting device a small cover allows the lighting of the pilot by means of a match.

The two screens at the bottom of the heater may be cleaned by a brush arrangement which is incorporated in the device. These screens are said to eliminate any fire hazard from the explosion of gasoline fumes, as the flame cannot work through the screens.

The heaters are made in several sizes and are very compact. Extra fittings are obtainable to control the flame thermostatically. This device may be set for any temperature desired and when in operation regulates the flame automatically. Where hot water is desired a coil may be installed in the heater and connected with suitable tank and water supply.

There are many arguments for garage heating; unless the car is brought up to a certain temperature at least once every 24 hours the accumulated moisture will in time cause great damage to the finish, the tires and the upholstery, if the car is being used during the winter.

HEATERS FOR THE CAR.

Where a car is used in the ice and snow, with the temperature near the freezing point, comfort demands some sort of a heating device in the car itself. The engine itself is a big source of heat and the exhaust gases may be utilized for heating the car. Most of the devices now on the market are designed to make use of the exhaust heat and can be used in either open or closed cars.

Perfection Heater.

The Perfection motor car heaters, made by the Standard Parts Co. of Cleveland, O., are manufactured in several styles, either in the flush type or for mounting directly upon the floor or seat.

**Electric Grip Warmer.**

The operation of all types is the same. The main heat unit consists of a tubular radiator, which is fitted with a shut off valve operated by hand and enclosed in a perforated steel case. The flush type fits into the floor and is both neat and attractive.

Two styles of open heaters are made; one type fitting into the corner under the seat, the other a type made for the seat board. All types are connected with the exhaust line by flexible tubing and proper fittings, which may be entirely shut off for summer driving.

Thermo Auto Heater.

The Thermo Auto Heater, manufactured by Cox Brass Manufacturing Co., 1733 Broadway, N. Y., is a manually or thermostatically controlled heating unit operated from the exhaust line. This device is a large flat heating plate made of polished cast aluminum or of cast iron, enameled in black. The surface is slightly corrugated to give ample and maximum radiating surface, yet smooth enough to be cleaned very easily. The exhaust heat is controlled in two ways. Connected with the entrance valve are

**Thermo Auto Heater.**

two strips of metal, the expansion and contraction of the larger opens or closes the valve, the smaller is operated from the outside and can be used to regulate the temperature by hand, and will shut off the heater when not required in warm weather.

No alteration of the floor of the car is required beyond the boring of three holes for the exhaust and vent lines, as the heater sets on top of the floor. The exhaust line is cut by a V shape hole, around which is clamped a fitting and flexible steel tubing, which conveys the hot air to the heater.

Two sizes of this heater are manufactured the first 28 inches long, four inches wide and one inch thick; the second, 14 inches long, eight inches wide and one inch thick. Both sizes are obtainable in either cast iron with black enamel finish or in polished cast aluminum.

The Utility Heater.

A heater of distinctive construction and design, called the Utility, is made by the Hill Pump Valve Co., Archer Ave. and 23rd Sts., Chicago, Ill.

This type is of tubular design and

**Wasco Garage Heating System.**

mounted in the tonneau or front compartment similar to a foot rail. The heating tube is enclosed in a perforated metal cover to prevent the burning of rugs, shoes or clothing, and may be turned either on or off at will.

A feature of this heater is the simplicity in construction, which admits of easy cleaning. By removing the valve end of the heater the interior may be cleaned of carbon accumulations.

This heater is also designed for exhaust line attachment and requires but little work or alteration in the car itself. The device is made in two sizes, 17 and 29 inches long, and is very attractive in appearance.

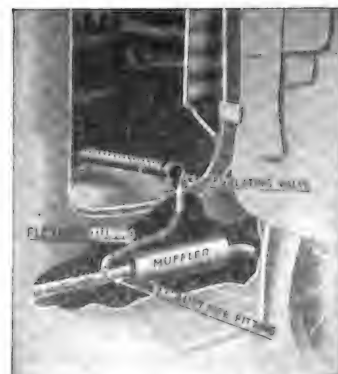
Although tonneau and closed car heating devices operating from the exhaust line serve the purpose of heating the body of the closed car and the lower part of open cars, the driver of an open car being exposed to the cold air frequently becomes chilled.

Carbon Brick Heater.

A car heater that is distinctive in action is called the Clark heater. This device may be obtained in a number of styles and sizes and consists in general of a strong steel box, covered with carpet or plush and containing a draw in which a specially prepared carbon brick is placed.

The draw is ventilated with a number of holes so that air will be admitted to the brick to support combustion. The brick is of prepared carbon, densely packed and is said to furnish a steady heat for a period of from 12 to 16 hours. Smaller bricks may be obtained where only a moderate heat is required for a period of from six to eight hours. These heaters are sold by the Chicago Flexible Shaft Co., at La Salle and Ontario Sts., Chicago, Ill.

(Continued on Page 22.)

**How UTILITY PROTECTED HEATER Is Attached to the Exhaust**



Fur Motor Cape with Collar Which May Be Brought Far Up Around the Throat and Ears. Courtesy E. Albrecht & Son, St. Paul, Minn.

A FEW days ago the intrepid motor woman who persisted in driving her car—or even riding in it—in the chill of autumn and the cold of winter was considered quite as much a fanatic as she who professes to find pleasure in her daily plunge after the ice has frozen on the nearby ponds. At the first indication of cold weather the average woman motorist hung her summer motoring clothing away in the closet and there they staid until spring again made driving a pleasure.

Nowadays winter holds no terrors for the motorist, for wide awake designers and manufacturers have been quick to take advantage of the fact that motoring raiment is not confined to one season. The splendidly made line of practical wool coats, the wide variety of the fur garments, with their smart lines and warmth giving qualities, the excellence and beauty of the up-to-date motor robes and the many practical accessories are evidences that cold weather will find more motor women on the road this season than ever before.

Fashion's verdict this year is a season of furs for the motorist. There are the most attractive coats of fur and coats which aren't of fur are, as a rule, fur trimmed; if not trimmed with fur then the motorist wears her animal scarf or cape collar of fur, which gives very ample protection and keeps her beautifully warm. Motor suits and frocks have their measure of fur and even motor blouses follow suit and display the season's fancy.

As a rule all coats are belted. The belts are invariably of the fabric, but may be either wide or narrow. Some very chic belts on the later models measure six inches in width and button with four buttons at the front. When they are made narrow they are usually from one inch to two and one-half and are twisted twice around the waist. Hudson seal retains its wonderful popularity and

Motor Fashion Mocking The Mercury

By Mrs. A. Sherman Hitchcock

is unquestionably the fur coat of the season. The model shown is one of the very new ones and is unusually handsome and vastly becoming to the majority of women. Some handsome models are trimmed with skunk, kolinsky, taupe fox and taupe wolf, but many of the best models come with plain collars and cuffs. In the cape collars there are those of Hudson seal, beaver, wolf, kolinsky, fitch, skunk, mole and nutria. These capes, falling well over the shoulders or even to the waist, with soft collars that can be rolled high and close about the throat or turned away from the throat, are excellent for motoring



This Especially Good Motor Cape Model of Hudson Seal Covers Back and Shoulders and Has a High Collar. Courtesy E. Albrecht & Son, St. Paul, Minn.

and costly silver fox. The extreme popularity of foxes at the present time, especially the American foxes of all kinds, is because of the beauty, the character, the wide range of colors, as well as the extreme silky texture and fluffiness of the fur. The woman motorist must remember that her sole protection against imposition in purchasing furs of any kind, her insurance of quality and value, is to make her purchase of firms of unquestioned standing and reliability. This is a most important question and if due consideration were given this particular point there would not be so many purchases of dissatisfaction in fur garments.

There is a most decided liking among all motoring women for the coats of wool velour, as well as Poilu, Kashmir, Hillendale and all the soft finish woolens. The motor woman has to play the Spartan to pass these models by. They are made up in such delectable colorings, lovely medium blues and browns and greens and grays and taupes, that to see them is to want at least one of these coats. The fur fabrics are used for trimming in many instances and all of the small furs are called into use when the coat itself does not carry fur trimming. The wool muffler, which, up to recent seasons, hadn't a show in the mode since the Victorian days, is now a matter of decided importance in the motor wardrobe and even forms part of the coat in many instances. A handsome model of this type was shown recently at one of the exclusive designers and was built of a dull green Poilu cloth, lined

with Zantine silk in a color combination of tan, brown, red and green. It was in rather severe, straight line effect, and had a long muffler of the material and lined with the Zantine, finished at the ends with chenille embroidery in black. The muffler was long enough to wind around



One of the Season's Best Motor Models in Frocks, Posed by Mrs. Vernon Castle. Made of a Deep Shade of Blue in Satin Patria. Copyright 1917 Ira L. Hill, New York City.

wear. The animal scarf comes in a great number of different furs, with the fox far in lead as to popularity. There are the lynx, wolf, fisher, moufflon, skunk and raccoon. The fox furs range from the plebeian gray Argentine to the aristocratic Arctic blue fox and the rare

the throat two or three times and, after crossing at the front, hang nearly to the bottom of the skirt. Wonderful comfort is assured by wearing a garment of this character.

Among the new ideas are motor coats and capes lined with corduroy instead of the usual materials. This lining of ribbed velvet gives substance to coats whose outer fabric is of light weight material. The corduroy lining may be that of any of the smart shades, according to that of the coat material itself. There are some stunning shades in the popular Waterside corduroys, and not length of service alone, but beauty of weave, soft, pliant quality and fine finish combine to make the Waterside corduroy the one best liked by the discerning woman. Among the colors particularly adaptable for lining the motor wraps are putty, delft, coral, amethyst, Copenhagen, silver, Burgundy, Russian and matelot.

The motor wardrobe which does not contain the serviceable blouse and separate skirt will be sadly lacking in practicability, for there are so very many occasions when no other style of clothing answers the purpose. A blouse that is indeed worthy a guarantee of excellence in durability is the new one of Jazz Crepe. This material resembles the more expensiveorgette to a very considerable extent and will wash and wear far better than any sheer material of its kind. There are some lovely colors, maize, flesh, rose, Copenhagen, navy, brown and white, and the various styles in which Jazz Crepe may be found are decidedly smart and modish. The Woodstock has the new roll collar of wash satin and a smart vestee effect. Another model, the Lindsay, has the roll

collar and cuffs of wash satin and one large pearl button in front at the termination of the collar. Milady dainty is a Jazz creation in more dressy style with the new large collar and plaited frill front trimmed with heavy torchon lace. This new and attractive material will stand a great deal of really hard wear and still retain its original appearance. Nothing has been brought out heretofore in the sheer fabrics that is so perfectly adaptable for motor wear.



A very smart and severe, yet altogether attractive, model for the motor frock is built with the fashionable long sleeve and fairly high neck, which gives it much practicability for wear beneath the long coat and even though it carries no elaboration, it is decidedly modish with its tucked skirt and puffed sleeve. Satin patria is the material used, in a dark blue. This material has much firmness and will neither crease or muss,

ABOUT THE ILLUSTRATIONS.

Above: This model of Worumbo wool velour in brown shows the most exclusive designing and is the ideal suit to wear beneath the cape or large cover-all coat. Note the various earmarks of modishness, the smart vestee with the high collar and the novel cut of sleeve. Again we see the small velvet hat—the badge of the smart motorist. Suit designed by Madame Bailey, Chicago, Ill.

On the Left: In coats this charming Princess model accords perfectly with the most recent dictates of fashion for the woman motorist. It is made of wool velour, with a large convertible collar ornamented with an inlay of new lamb fabric, which also embellishes the pockets. It may be had in Burgundy, dark brown, green and navy blue. The small, close-fitting hat of velvet is an excellent model for wear in the car.

Model on the Right: Here is one of the newest models of the furrier's art—the semi-fitted coat of Hudson seal. It insures warmth and protection and shows to decided advantage the season's popular straight line effect. The shawl collar may be adjusted to cover neck and ears and the bell-shaped cuffs are a mark of distinctiveness. Courtesy E. Albrecht & Son, St. Paul, Minn.

two very important factors to the motorist. It possesses suppleness and lustre, there are many lovely shades and it comes in 40 inch width. Two other very notable materials which cannot fail to interest the motor woman are the Gilt Edge Poplin and Satin Militaire, both of which will be strongly in evidence for spring wear.

There are so many attractive and practical articles which will make the most acceptable Christmas gifts for the woman who motors that no one should be at a loss regarding a gift to their motoring friend. There are bags, robes, gloves, vells, wool caps and scarfs, pillows and all sorts of little accessories which will greatly please the woman motorist.

Motor pillows of colored corduroy with pocket in the centre, snap fastening and handle are splendid accessories and there are back rests of panasote leather which are sure to prove a boon to almost any woman. The new air pillows are made to match almost any robe and are usually of heavy plush and are about 10 inches wide and 12 long. Some motor women are having pillows for the car made of leather with a large monogram of pigskin in the centre and they are very effective. A Polar Motorrobe would make one of the finest of gifts and prove a constant reminder through all the winter of the generosity of the giver. The Polar has a leopard skin effect on plush and is rubber interlined. There are a number of the Stroock Motorobes—of which the Polar is a member of the family—that are especially appropriate for the gift purpose. For she who drives the sedan there is the Princess, a very high grade crushed plush faced robe, with wavy mohair plush back, in the most charming of colors. For the limousine friend the National is particularly



adaptable and is a very soft plush robe, charming in its quality and colorings. All the Motorobes can be had with muffs or pockets if desired.

From far Japan comes the Kairo, a device for keeping the hands warm while motoring. It is made in a convenient size, of heavy tin with a copper coating, covered with brocade and sells for a very small sum. Another style comes made entirely of copper and covered with navy blue velvet and sells for a few cents more than the former. They are really wonderfully effective on a cold winter's day. There is also a Japanese device for use in the car to keep the feet warm. It is velvet covered and can be had in shades to match the upholstery of the car.

A pair of the new heel protectors of patent leather made with an elastic strap is an excellent gift for the woman who drives her own car. Gloves are always most welcome and there are many excellent models. There are some especially good looking and well made very new models among the "Wear-Right" gloves, which combine style and

Continental Shafts Are Balanced By Air Blasts

Big Motors Concern Using Ingenious
Special Method to Produce a Per-
fect Engine Part.

The Continental Motors Corporation of Detroit has installed an advanced ingenious method of dynamically balancing engine crankshafts at its plant, which is said to accomplish this necessary work efficiently and economically, as much long and comparatively expensive testing is saved.

In this new method the shaft is not influenced by mechanical means of rotation, but is operated by a jet of compressed air impinging against the surfaces of vanes attached to the crankshaft that is to be tested. The crankshaft is supported in a pair of stirrups hung on pivot points, and its centre

which it is passed to a mechanic who removes the necessary amount of metal at points indicated, so that the shaft is ready for use.

DE PALMA BREAKS ALL RECORDS FOR SIX HOURS.

Ralph De Palma, driving a Packard, motored with a Liberty engine, covered 633.12 miles in six hours in a test at Sheepshead Bay Speedway the second week in November, breaking all the world's records for one, two, three, four, five and six hours.

The previous world's record for that time, 566 miles, was made at the Brooklands track in England in 1913, by Dario Resta, Gene Chossagne and Lee K. Guinness, driving a Sunbeam car in relays. These drivers averaged only 94.4 miles per hour, while De Palma's average was 105.6.

The new records and old are as follows for the six hours:

1	2	3	4	5	6
New Record—					
112.96	224.91	329.56	440.56	535.72	633.12
Old Record—					
107.9	195.1	289.00	380.00	473.00	566.00

Fred Wagner officially observed the contest for the A. A. A.

This was the second time in one week that De Palma shattered world's record for motor car speed, having earlier in the week covered 10 miles in 5:17:41, making a new record for cars of 231 to 300 cubic inches also.

HEATING EQUIPMENT.

(Continued from Page 19.)

Ieco Steer Warms.

The hands are the first to suffer, and cold hands are not conducive to careful driving. The Ieco Steer Warms consist of two neat leather covered grips, one for each hand, which lace onto the steering wheel at any place convenient for driving. Special resistance wires are cleverly arranged between two copper plates in such a way that very little current is sufficient to keep the grips warm. They operate on the same principle as an electric heating pad, either from the Ford magneto or a storage battery, and are so designed as to keep at an even temperature. The manufacturers, Interstate Electric Co., New Orleans, La., claim that the device requires only about as much current as is required for one electric headlight.

Electric Grip Warmer.

Another grip or steering wheel warming device is sold by the Electric Heating Element Co., 11th Ave., South, and Franklin St., Minneapolis, Minn. This device consists of two leather covered pads, which are strapped around the steering wheel and connected with the storage battery, or with the Ford magneto. In operation the manufacturers claim a current consumption of less than half that required for the headlights.



Continental Dynamic Balancing Machine at Rest and in Action; Air Impelled Fan Visible in Picture at the Left.

durability to an unusual degree. The quality is most excellent and the fit unusually good. The sand color is very smart and the gray and tan both very modish. The conditions in the glove field are so disturbing at present, with no immediate change, that gifts of gloves are most practical and the motor woman can scarcely have too many on hand.

COLE TOURSEDANS FOR OFFICERS.

The government has placed a contract for a large number of Cole toursedans with the Cole Motor Car Co., Indianapolis, Ind. These machines will be used for the army officers and will be finished in olive drab with black leather upholstery.

NEW REO SALES MANAGER.

R. J. Cook has been appointed as sales manager in charge of Reo sales for the Reo motor car, Lansing, Mich. He was for a numbers of years associated with the Pittsburgh branch of the Ford Motor Co.

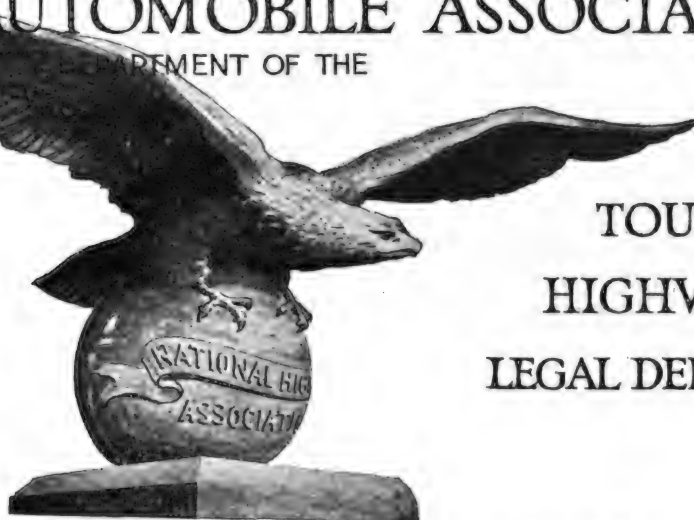
line is directly beneath the centre line of the pivots. Hardened steel anti-friction rolls are fitted in the stirrups and are spaced so that they make contact with the journal at either end of the shaft. A six bladed turbine carrying the vanes is attached to the centre bearing shaft and when the air is turned on a micrometer dial mounted on an independent support and making contact with the shaft at either end, indicates the vibration.

The turbine wheel is 18 inches diameter and each blade is 1.56 inches in diameter. The nozzle of the air jet has a deflector and is so located that the current of air, projected horizontally, strikes the highest point of the impeller blades at a tangent about three inches back of the centre line. Because of the pivot support the shaft may be swung laterally and longitudinally.

When the crankshaft is revolved to a certain speed the indicators show the unbalanced masses and the operator compensates for these by attaching small balancing weights. This process continues until the shaft is in balance, after

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LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

Uniform Traffic Laws for New England

Six States Should Also Consider Cooperative Registration,
Licenses, Uniform Sign Boards and Uniform Route Markings

IT IS apparent that nothing short of uniform traffic laws for cities and towns will become an absolute necessity in Massachusetts at no far distant date. The same is true of other states in New England, as scores of cities and towns have already adopted traffic rules, some of which contain numerous provisions and all of which are more or less different from the others. This is bound to make for confusion, or worse, and one of the simplest ways of meeting the situation is for the state to enact uniform traffic rules for municipalities and prohibit the cities and towns from altering or supplementing them. The Empire state has already adopted a uniform traffic law, which is now in operation in the various cities and towns in New York state, and will doubtless prove a convenient and salutary regulation.

In this connection we are constrained to repeat the suggestions given in these columns in the issue of Oct. 10, as improvements that might well be brought about in the near future:

First—A uniform traffic law, simple, concise and sensible, for the cities and towns of each New England state.

Second—A New England registration tag or identification plate.

Third—A New England chauffeurs' and operators' license.

Fourth—A uniform sign board for all New England state highways as well as for all cities and towns.

Fifth—A uniform marking of routes by

colored bands upon posts, fences, trees, etc., such as is found now, in a more or less uniform degree, in Massachusetts, New Hampshire, Connecticut and Rhode Island.

The enactment of laws which would put into operation these five things would be a wonderful improvement over the present method of regulating motor vehicles and their operators in New England.

POLICE ACTIVITIES.

Fitchburg. A new ordinance is in effect in this city prohibiting the parking of vehicles of all kinds in Main street from West street to Merriam avenue, and in Central street from Monument square to Central square for a period longer than 30 minutes. Recently motor car owners found their cars missing and in order to recover them were required to meet a bill for storage. The chief of police of this city has declared that this rule, as well as other traffic ordinance, shall be strictly enforced.

Millbury. The board of selectmen of this town are planning to stop the speeding of automobiles on the new cement road running between Millbury and the city of Worcester.

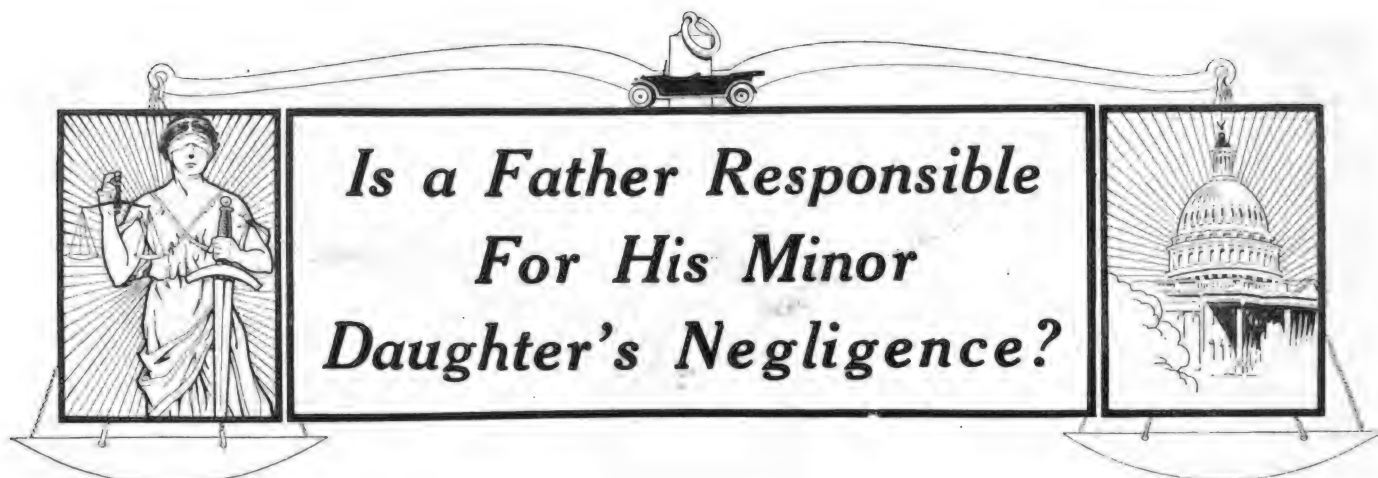
Cambridge. Owing to the large number of serious accidents which have occurred in this city recently, the mayor of the city has decided to take active measures to put an end to or at least to check speeding automobiles in several of the important thoroughfares, and especially in and

along Massachusetts avenue. Action seeking this result may early be expected from the police authorities and we warn motorists to be careful in driving their automobiles through the University City.

WARNING TO MASSACHUSETTS MOTORISTS.

It will be well for owners of automobiles registering their cars in Massachusetts to remember that those who do not have their registration plates ready to be attached to their automobiles on the first day of January next will have only themselves to blame, as the Highway Commission is now prepared to register every automobile in Massachusetts for the year 1918.

Moreover, it will be well to remember that there will be no "days of grace" as heretofore, during which owners will be permitted to operate their cars with 1917 plates. Delinquent motorists will find themselves liable for arrest if they attempt, after New Year's day, to use their old plates. One rule of the commission is to be this year rigidly enforced and that is that every application for registration for an automobile shall contain all the information required by the commission. Therefore, we suggest to motorists who intend to register their cars in Massachusetts to answer every question contained in the application blank.



Is a Father Responsible For His Minor Daughter's Negligence?

BY A RECENT decision of the Court of Appeals of Virginia, considerable interesting light is thrown upon the responsibility of a father for the negligence of his minor daughter in operating the family automobile.

The plaintiff in the case was crossing a public highway when he was struck by an automobile owned by the defendant and operated by his daughter, a minor of 19 years of age, and brought this action to recover damages from the father for the alleged negligence to his daughter.

It appeared that the defendant bought and kept the car for the use and pleasure of himself and family. He was a deputy sheriff, and also used the car sometimes to discharge his official duties. The daughter was a careful and experienced driver and on the day of the accident she sought and obtained permission from her father to use the car that afternoon for the pleasure and entertainment of herself and her cousin. It affirmatively appeared that the daughter was not using the car on an errand or business of the father, but was driving alone for the pleasure and entertainment of herself and friend.

The controlling question in the case is presented by opposing instructions requested by the plaintiff and the defendant, respectively. The instructions offered by the former embodied the proposition that if the defendant purchased the automobile for the use and pleasure of himself and family, and at the time of the accident his daughter was a member of his family and under 21 years of age, and was using the automobile for her own pleasure and the entertainment of her friends, with the knowledge and consent of the defendant, then the defendant was liable for the negligence of his daughter to the same extent and in like manner as if he personally, at the time of the accident, had been driving the automobile. The opposing instruction requested by the defendant in effect was that in order to render the defendant liable for the negligence of his daughter it must have appeared by a preponderance of the evidence that at the time of the accident she was operating the automobile in transacting some business, or in the management of some

affair of the defendant, and by his authority.

The court rejected the prayer of the plaintiff and gave the instruction requested by the defendant, which ruling resulted in a verdict and judgment for the defendant.

The Court of Appeals of Virginia says that two theories are advanced why the owner of an automobile should be liable for injuries inflicted upon third persons by his minor child while using his machine, with his consent, for the child's own pleasure and business, namely:

First, because the parent is responsible for intrusting the dangerous machine in the hands of his child. This liability, it will be observed, does not depend upon the child's negligence, but upon that of the parent in permitting the child to use a dangerous instrumentality.

Second, the second theory proceeds upon the assumption that the parent originally purchased the machine for the use and pleasure of the family, the use of it by the child with the parents' permission for its own pleasure is but applying it to the business for which it was bought, and, therefore, the child's use of it was for the parents' business.

In a former decision of this court it was held in answer to the first proposition, that an automobile is not such a dangerous machine or agency as to make applicable to it rules requiring extraordinary care in the use and control of instrumentalities which are dangerous to use.

The second proposition is discussed in a New Jersey case as follows:

It bases the creation of the relation of master and servant upon the purpose which the parent had in mind in acquiring ownership of the vehicle and its permissive use by the child. This proposition ignores any rational element in the creation of that status as to third persons, that such use must be in furtherance of and not apart from the master's service and control, and fails to distinguish between a mere permission to use and a use subject to the control of the master connected with his affairs. The reasons for liability is founded upon the idea of control which a master has over his servant. The court, although at-

tempting to rest the liability upon the relation of master and servant, yet actually tested the liability by the fact that she was intrusted with the operation of the machine for her own pleasure, if purchased for that object, whereby she ipso facto became a servant. So that the judge thus in fact left the legal relationship of master and servant out of account, and rested it in name only, because the daughter was allowed to drive the machine. In this there was error.

In a recent New York case it was held that it has always been supposed that a person who was permitted to use a car for his own accommodation was not acting as agent for the accommodation of the owner of the car * * *

The attempt is made, however, to reconcile these apparently contradictory features of this proposition by the assertion that the father had made it his business to furnish entertainment for the members of his family, and that, therefore, when he permitted one of them to use the car for the latter's personal and sole pleasure, such one was really carrying out the business of the parent, and the latter thus becomes a principal and liable for misconduct. This is an advanced proposition in the law of principal and agent, and the question it presents really resolved into one of whether as a matter of common sense and practical experience we ought to say that the parent who maintains some article for family use and occasionally permits a capable son to use it for his individual convenience, ought to be regarded as having undertaken the occupation of entertaining the latter, and to have made him his agent in this business, although the act being done solely for the benefit of the son. That really is about all there is to the question.

Not much can profitably be said by way of amplification or in debate of the query whether such liability would rest upon reasonable principles: whether it would present a case of such theoretical and attenuated agency. If any, as would be beyond the recognition of some principles of law, as they are originally applied to that relationship. The question largely carries on its face the answer which ever way it may be made. Unquestionably an affirmative answer has

been given by the courts in some of the states * * *

Resting our decision upon the precise facts of the case in hand, which are practically undisputed, we hold that relationship standing alone does not render the father liable for the acts of his minor daughter; that such a liability must result from the relationship of master and servant, or principal and agent; and that the absence of that element of responsibility in this case affirmatively appears.

PERTINENT STATEMENTS ON HOW NOT TO CROSS A STREET.

In a recent case before the Supreme Court of Pennsylvania, it appeared that the plaintiff charged the defendant with the death of her husband, due to the negligence of the chauffeur of the defendant. It appeared that the plaintiff's husband was attempting to cross a street in the city of Philadelphia; he saw and avoided the motor truck of the defendant, but in doing so stepped backward in front of a street car, which was approaching in the opposite direction, and which he did not see, but which he could have avoided if he had looked.

The court said that it must be remembered that the motor truck did not strike the plaintiff's husband, but that the immediate cause of his death was his own act in stepping backward directly in front of a trolley car. The trial judge instructed the jury that there was no evidence in the case that the motor truck was being driven recklessly or at any excessive rate of speed. The plaintiff's husband saw it approaching him, so that no further warning to him was necessary. Had there been nothing in his way when he stepped backward, it is likely that he would have had no real cause of complaining against the driver of the motor truck. He evidently did not hear or see the trolley car, although it was within plain sight and almost within touch. It is difficult to see in the evidence anything from which negligence upon the part of the chauffeur can be fairly inferred. He had his truck under control and brought it to a stop within a few feet; he did not strike the plaintiff's husband and the inference that he would have done so had the plaintiff's husband remained standing where he was was not justified. It is quite as probable that he would have been able to stop his machine or turn it to one side. On the other hand, the evidence of contributory negligence upon the part of the plaintiff's husband is clear. He paid no attention to the approaching trolley car, but stepped backward directly in its path. Had he raised his eyes for an instant and looked in the direction in which it was coming he would have seen the trolley car and common guidance would then have caused him to pass directly to the curb, or if he thought the motor truck too near for that he could have taken a few steps directly to the north and thus have avoided contact with either the motor truck or trolley car.

There was no occasion for him to step directly backward into the right hand corner of the fender of the car. Nothing but failure to observe its presence can account for his action in that respect. The conclusion is irresistible that failure to look for the approaching trolley car with which he collided was the direct cause of the injury. The plaintiff's husband's attempt to cross the street between two vehicles, both in plain sight, approaching in opposite directions, one of which he saw and avoided, and one of which he evidently did not see, but which he could readily have avoided, if he had looked for it before stepping directly in its way. He was, therefore, guilty of contributory negligence.

MOTOR OWNER NOT LIABLE FOR INJURY TO A GUEST.

The Supreme Judicial Court of Massachusetts has just decided an interesting case holding the owner of an automobile not liable for an injury to a guest while riding in the owner's car.

It appeared that the plaintiff, while staying as a guest of the defendant, went out with the defendant in her automobile. The automobile was driven by a chauffeur furnished by the garage where it was kept. Through the negligence of the chauffeur the automobile was overturned and fell on the plaintiff, causing the injuries complained of. The jury found that while driving the machine the chauffeur acted as the defendant's servant, and this finding was warranted by the evidence. The jury also found that the accident was caused by the negligence of the chauffeur. Upon the jury making these findings the judge directed them to return a verdict for the defendant and reported the case to the Supreme Court.

In a previous case (*West vs. Poor* 196 Mass. 185), the court said that the defendant who invites a plaintiff to ride gratis in his carriage is liable to the same extent that a gratuitous bailee is liable. In the case under discussion the plaintiff asked the court to overrule this former decision in at least one respect. The court, after considering many English and American cases, held that it is plain that in England the liability of a gratuitous bailee and the liability of one who undertakes a gratuitous transportation is the same. And to this one thing there must be added, namely:

However much our English judges have quarreled with the meaning of the words "gross negligence," it is a fact that when pushed to a decision the judges of England have invariably held that to make out liability in case of a gratuitous undertaking (no matter what the nature of the gratuitous undertaking was), gross negligence has to be made out.

In holding that to charge a defendant with liability in case of a gratuitous undertaking to transport a person, the plaintiff must prove gross negligence because that is the measure of liability in case of the gratuitous undertaking or

keeping and carrying goods, it is not to be understood that gross negligence in the two cases is the same thing. In all cases (no matter whether the case is a case of ordinary or of gross negligence), the consequences likely to result is a fact to be taken into consideration in determining what ought to be done by the defendant to fulfill his measure of liability. For example: It might be held that the omission to do a certain thing in the transportation of goods was not negligence and that by reason of the seriousness of the consequence likely to result the omission to do the same thing in case of a transportation of a person would be negligence, and so in case of gross in place of ordinary negligence. This brings us to a consideration of the case upon which the plaintiff has placed great reliance. In that case it was decided that the defendant society was liable to the plaintiff who had been invited to attend a conference held in the defendant society's church at which the plaintiff was not a delegate, for injuries suffered by the plaintiff through a dangerous condition in the path leading to the church upon the jury finding that the defendant was negligent in the matter.

THIS DOCTRINE FURTHER EXAMINED.

That case has usually been cited when the doctrine that a charity is not liable for torts under the decision in *McDonald vs. Massachusetts General Hospital* has been set up for defense. It has never been affirmed as a decision upon the duty owed by a defendant who invites a plaintiff to enter upon his (the defendant's) land solely for his (the plaintiff's) purposes unless it can be held to have been affirmed or approved on that point by what was said by Mr. Justice Barker in the case of *Chapin vs. Y. M. C. A.* Of the decision in the case of *Davis vs. the Central Congregational Society*, it is to be observed that it was decided at a time when the distinction between a person going on the premises of the defendant for business to be transacted with the defendant and persons going upon those premises for business of their own had not been established. Were the case to arise today it might be contended that since the plaintiff in *Davis vs. Central Congregational Society* went on the defendant's premises for her own purposes she was in no better position than the plaintiff in *Plummer vs. Dill and Hart vs. Cole*. It is hard to see a distinction between the rights of a plaintiff expressly invited to attend a church conference to which she was not a delegate and a plaintiff impliedly invited to attend a funeral or a wake. But, however, that may be the decision in *Davis vs. Central Congregational Society* has no bearing upon the question before us. Whether one invited to come on to the defendant's premises for his (the invitee's) purposes alone takes them as he finds them or can hold the defendant for negligence in case the premises are in a dangerous condition for that reason is a question of the liability of one who enters upon a

gratuitous undertaking whether it be a gratuitous undertaking to keep, carry or lend.

As a matter of authority the case desired to be overruled ought not to be overruled. It must be taken as established in this commonwealth that to charge a gratuitous bailee the plaintiff must make out gross negligence on his part. The measure of liability of one who undertakes to carry gratis is the same as that of one who undertakes to keep gratis. To this is to be added the fact that in every case in England in which the question of the measure of liability of a person who enters upon any gratuitous undertaking has arisen the same conclusion is reached.

Justice requires that the one who undertakes to perform a duty gratuitously should not be under the same measure of obligation as one who enters upon the same undertaking for pay. There is an inherent difficulty in stating the difference between the measure of duty which is assumed in the two cases. But justice requires that to make out liability in case of the gratuitous undertaking the plaintiff ought to prove a materially greater degree of negligence than he has to prove where the defendant has to be paid for doing the same thing. It is a distinction which 75 to 195 years' practice in this commonwealth has shown is not a too indefinite one to be thrown out by the judge and acted upon by the jury.

PAINT LIGHT BULBS TO MEET LAW

Each Automobile Shall Illumine But One-Half the Road, Originator of the Idea Explains

THE new headlight law, which went into effect in New York state Nov. 1, has been given very serious consideration by the New York State Motor Federation, which reports that it has approved of 28 devices to comply with the law.

The New York citizen, who is responsible for the idea embodied in the law, says that the law can be complied with in a very simple and inexpensive manner, and that no special appliance is necessary. What confusion there has been, he says, has arisen from failure to read the law itself and in giving heed to reports of what the law maintained.

The main requirement is that there shall be a light ahead for 250 feet, but not over 42 inches high, to the left of the axis of the car, at a distance of 75 feet or more. Some of the reports sent out omitted "to the left of the axis," and that was entirely misleading, as this is the key to the law, for the principle involved is that each automobile shall light but one-half of the road. Therefore "to the left" means that there is not restriction as to the height of the light in front or to the right of the car.

"It is a simple thing to comply with the law," the inventor says, "and any car can be equipped to do so in a few minutes and at a cost of but a few cents. This is the way: Paint the right side of the light bulbs green and at the tip of the bulb make a circle of green paint one-half the diameter of the bulbs. The paint should cover the right hand side of the bulb, looking with the car, for an arc of 150 degrees. In order to insure quick drying the paint used should be mixed with about one-half turpentine. In placing the bulbs in the reflectors the painted part should extend 10 degrees to one side of the vertical centre of the reflector at the bottom. Care should be taken that the bulbs are focussed so that the light is thrown far ahead and to the right. The result will be to leave a dark

area to the left, as the law calls for, but the reflected light straight ahead and to the right will give plenty of illumination to drive anywhere, and these strong beams will be found to meet the conditions that the light be sufficient to reveal any object in the road 250 feet ahead. By a slight changing of the positions of the bulbs in the reflector the same lamp can be made to comply with the headlight laws in New Jersey and Massachusetts.

"I claim this principle is the solution of the headlight problem. It has to be seen at work in order to be appreciated. I discovered it more or less by accident. When the subject of an automobile headlight law was brought up for this state I thought as a matter of public spirit, for there is no gain in it for me, that I ought to place it before the Legislative Committee having the matter in charge. After a number of demonstrations before Senator Hewitt and others the idea was incorporated into a law.

"At first driving with such lights gives an odd sensation, for telegraph poles, fences and trees are brilliantly lighted, but everything to the left of the centre of the road is in darkness. This causes one to keep well to the right, and the practical effect is to prevent one from 'hogging' the road. To light the left side of the road momentarily a slight turn of the steering gear is all that is necessary. Pedestrians that are overtaken have their backs to the road and are not affected. I have met and passed automobiles, moving vans, horse drawn vehicles and pedestrians without throwing any light on them when they were on the right side of the road. By this method of lighting there is no danger of a collision, for nothing can be run into which is not in the lighted area."

A line of motor 'buses has been placed in operation between Chicago and Camp Grant, the cantonment near Rockford, Ill.

TO MAINTAIN AN AUTOMOBILE'S EFFICIENCY.

In order that an automobile's efficiency may be constantly maintained, motorists are advised to look for the following troubles, thereby saving considerable annoyance and expense:

Faulty Ignition—

Spark advanced too far.

Spark too late, causing overheating.

Short circuits in ignition system, causing irregular spark.

Wrong timing of ignition system; too early, too late, or wrong order.

Dirty distributor, misdirecting the current.

Faulty Carburetion—

Preignition, due to excessive carbon deposits.

Rich mixture, causing overheating.

Lean mixture, in conjunction with worn parts.

Faulty Lubrication—

Lack of oil.

Lubricants of poor quality.

Excess of oil, causing carbon deposit.

Overheating of Engine—

Fan not working.

Pump parts not revolving.

Radiator clogged.

Pipe line clogged.

Rubber hose defective inside, blocking flow of water.

Ignition time too late.

Faulty Compression—

Engine designed with too high compression, causing preignition.

Mechanical Looseness Due to Improper Adjustment or Wear—

Loose connection rod bearing, crank pin end.

Crank pin bearing out of round.

Main bearings of crankshaft loose.

Bearings too tight.

Wrist pin loose in piston.

Wrist pin loose in upper end of connecting rod.

Wrist pin not in line with crankshaft, causing side slap.

Piston ring loose in slot or broken.

Cam follower guide worn.

Cam loose on shaft.

Camshaft bearing worn.

Worn cams (flat spot).

Flywheel loose on crankshaft (old models with keyed on wheel).

Flywheel out of balance.

Timing gears loose on shaft.

Worn or broken timing gear teeth.

Cylinder loose at its base.

Engine loose from frame.

Piston too small for cylinder, causing side slap.

Poor push rod adjustment—gap too great.

Exhaust or inlet valve sticking guide.

Spark plug touching valve.

Magneto coupling loose.

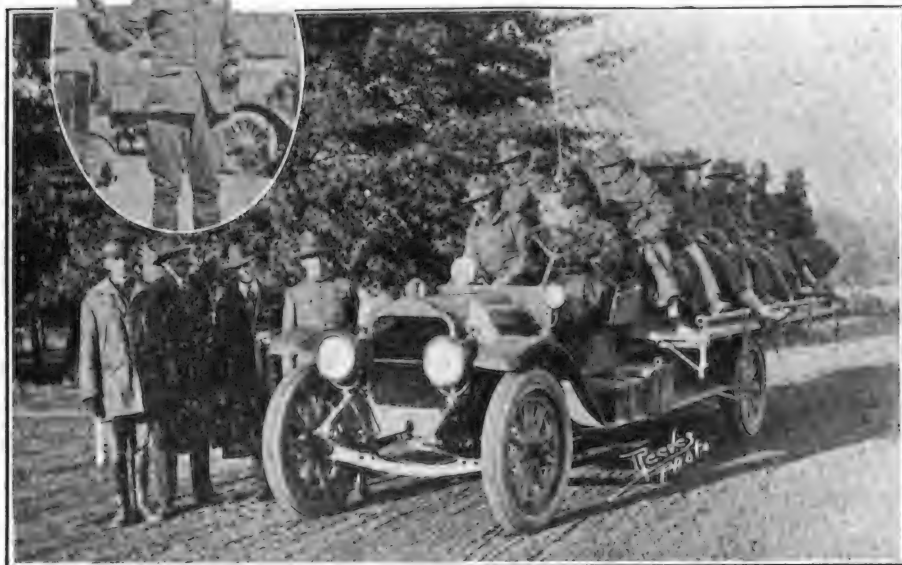
Fan belt coupling striking a pulley.

Fan blades striking something.

Worn cylinder, causing side slap.

Bent crankshaft.

Dixie Military Road Tests



Truck with Specially Designed Body to Transport Soldiers on Phenomenal Run from Atlanta to Chattanooga. Col. T. A. Pearce, Standing Near Truck, Detailed by the War Department to Make a Special Report. Insert, Sergt. O. M. Thomas, with a Record of 27 Years' Army Transport Service, in Charge of Truck Supply Trains.

Southern Enthusiasts Boost Good Roads Movement by Practical Demonstrations of Soldier and Supply Transport

AT A TIME when the railroads are congested with freight and the question of transportation is one of the most vital now confronting the government, the successful tests of overland haulage by motor trucks in various parts of the country take on added significance and should result in additional impetus for the good roads movement. There are many transcontinental rail systems and branches which tap the eastern and western points, but few connecting up the important central points in the North and South, a fact which makes the promotion of the Dixie Highway, from Detroit to Miami, Fla., routing as it does through many important southern cities, of primary consideration.

Between the Quartermaster's Depot at Atlanta, Ga., and the regular army cantonment at Ft. Oglethorpe, near Chattanooga, Tenn., tests in transporting both soldiers, clothing and hardware were made under the auspices of the army officials on Oct. 30. A White motor truck carrying 18 soldiers and their full equipment, making a total load of over two tons, made the trip from Ft. McPherson, near Atlanta, to Ft. Oglethorpe, over the Rome route of the Dixie Highway, a distance of 135 miles, in five hours and 32 minutes, and the return trip over the Dalton route of the Dixie Highway, a distance of 124 miles, in five hours and one minute. It was estimated that fully three hours was saved as compared with the time that would have been required by railroad, as it would require all the that time, if not more, to march the men to the railroad stations and entrain them. A saving of \$2.84 per man was

shown in transporting the men by truck over the Rome route and \$2.89 per man via the Dalton route, as compared with railroad transportation costs. A special body was used on the White truck, the design of Lieut. Col. H. J. Gallagher, Depot Quartermaster at Atlanta. Each soldier has a separate seat and they are so arranged that all the soldiers can fire in the same direction from the truck. Convenient lockers are located under and behind the seats for guns, packs, ammunition and rations.

When the soldiers arrived at their destination they were fresh and fully equipped for immediate service. The truck was driven by A. G. Seanor, southern sales manager of the White company. He made the following report of the run:

Tuesday—Tires, Goodrich Silvertown and De Luxe; road conditions, generally fair; distance going from Five Points to Oglethorpe via Rome, Ga., 132.6 miles; actual running time, 5 hours 33 minutes; average mile per hour, 24; gasoline consumption, 24 gallons, costing \$6.24; oil consumption, four gallons, costing \$2.40; depreciation, tires, \$5.27; truck, \$4.51; total cost, \$18.72; cost per man, \$1.04; cost per man per mile, \$0.0074.

Wednesday—(Returning via Dalton) Road conditions, fair; weather, fair; miles covered, 125.7; actual running time, five hours, one minute; average miles per hour, 25; gasoline consumption, 21 gallons, costing \$5.46; oil consumption, three gallons, \$1.80; depreciation, tires, \$5.28; truck, \$4.27; total cost, \$16.81; cost per man on return, \$0.934; cost per man per mile, \$0.0074.

The record made by five two-ton trucks used in the transportation of supplies from the warehouse of the Depot Quartermaster in Atlanta to the regular army cantonment at Ft. Oglethorpe on the same date gave further evidence of the value of highways for military, as well as commercial use. In Indiana a truck carrying two tons made the trip over the Dalton route in eight hours and seven minutes, making a complete delivery from the time the supplies were loaded on the truck at Atlanta. Over the Rome route another Indiana truck made the trip in eight hours and 30 minutes. Both Indianas were driven by enlisted drivers from the Quartermaster's corps and were in charge of regimental supply sergeants detailed from the regiments at Ft. Oglethorpe. The cost of handling the shipments of government supplies averaged \$7.97 per ton, as against a charge of \$9.59 per ton in less than car load shipments by rail.

The test was inaugurated by the Dixie Highway Association with the co-operation of the Chattanooga Automobile Club and the Georgia State Automobile Association and the Atlanta Automobile Club for the purpose of making a practical demonstration of the need of construction of the Dixie Highway for military purposes, but the military authorities were in active charge.

Maj. A. L. Bump of Ft. Oglethorpe detailed Sergt. O. M. Thomas, who holds the record for long service in the transportation department of the army, to be in immediate charge of the trucks. Col. T. A. Pearce of Camp Gordon, Atlanta, was specially detailed by the War Department to observe the test and its results and make an exhaustive report to the government. Two United States trucks, two Superior trucks and a light Reo truck also went the route.

SUPPLY OF GASOLINE AMPLE.

There is little anxiety over the gasoline situation, as the supply is said to be ample for all needs if ordinary precaution is employed in its use. The latest reports from the U. S. Bureau of Mines shows a substantial increase in shipments in September as compared with August, but this was taken from reserve stocks, as the production fell off owing to shortage of labor to drill wells.

BRASS SIGNS FOR COMMERCIAL CARS.

Every owner of a truck, or delivery car, realizes just what a valuable advertising medium his machine offers. His name on the side of the machine is brought before his patrons and prospective customers daily. Neat and attractive brass signs for this sort of work are marketed by C. H. Buck & Co., Inc., 401 Dorchester Ave., Boston, Mass. This concern is interested in establishing agencies through the country.



Accessories Department



VETERAN TRANSMISSION LINING.

The cork insert transmission lining on the Ford brake band pictured herewith is one of a set that was used for more than a year on a Ford car as the power unit to draw a trailer. This trailer was in use practically every day hauling loads which totaled as high as 2500 pounds.

As the picture shows, this lining is still in excellent condition, and probably good for thousands of miles more of hard service. The long service secured from this set of linings is attributed to the buttons of cork which are inserted in a heavy fabric. Cork is said to produce an extremely smooth friction action, and when this substance is used much of the slip and tearing action of the frictional surface is eliminated, thereby prolonging the life of the fabric.

Cork has also the advantage of wearing very slowly, and as a result of this it is said by the manufacturers that cork insert transmission lining delivers a length of service which makes it decidedly economical.

This product is manufactured by the Advance Automobile Accessories Corporation, Dept. J 3-1, 56 East Randolph St., Chicago, Ill. Price, \$3 per set of three.

THREE SQUARE SCRAPER.

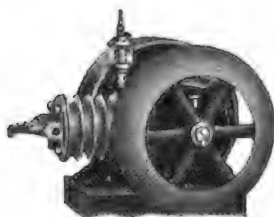
One of the tools that is indispensable in a repair shop is the bearing scraper. While different mechanics have their own ideas of the shape of the tool, the three square scraper illustrated is radically different from the ordinary type of curved scraper and will be found a very convenient tool for ordinary work.

It is made from the best of steel, carefully hardened and ground hollow on its three sides and fitted with a stained and polished maple handle.

Manufactured by Stevens & Co., 375 Broadway, N. Y. Write for prices.

BEACH GRIP PULLER.

A good wheel or gear puller is as indispensable in a garage as a hammer. It may be used in a great many ways. It is practically the only tool with which a



Toledo Air Compressor.



Beach Grip Puller.



Three Square Scraper.



Veteran Transmission Lining.

flywheel may be removed without the danger of breaking the crankshaft.

The Beach automatic grip puller is of special design and extremely strong. It is so designed that when pressure is applied by turning the screw the jaws are pulled toward the common centre, thus making a positive, but automatic grip.

The body of the device is so designed that the jaws are removable, simply by the slipping out of the cotter pins and cross pins, thus permitting the insertion of larger or smaller jaws. With the device two sets of jaws are furnished; three 7½-inch jaws, which open to 10 inches, and three 12-inch jaws, which open to 18 inches. Either a two or three-jaw combination may be used, as there is an extra jaw socket directly opposite one of the other jaws.

Manufactured by the Greb Co., 202 State St., Boston, Mass. Price, \$20. Liberal discount to dealers and garages.

TOLEDO AIR COMPRESSOR.

An air compressor which is said to contain a number of interesting features in design is herewith illustrated. This compressor has two compressing strokes and its action is as follows: As the piston travels to the top of the stroke a charge of air is drawn into the base of the machine. This charge is compressed at the downward stroke of the piston and forced into the cylinder, where it is again compressed at the up stroke and forced into the tank.

The cylinder has a three-inch bore and the piston a three-inch stroke and at 208 revolutions per minute fills a 12x60 inch tank to 80 pounds pressure in three minutes and to 160 pounds in 11 minutes. The cylinder is cast with cooling fins and air circulation is maintained by cooling fan on the flywheel. The pistons are long and carry five rings. The bearings are of bronze and the entire machine is heavily constructed.

In addition to the size above described, the manufacturers are building a compressor having a 3¼ inch bore and a 4½ inch stroke. Operating at 200 revolutions per minute this size fills a tank 24x60 inches to 205 pounds per square inch in 30 minutes.

Manufactured by Toledo Gas Engine Works, Toledo, O. Write for prices.

THE AUTOREELITE.

A spotlight that has a number of uses for many purposes is called the Autoreelite. As the name suggests the light is provided with a reel upon which is wound 12 feet of flexible cord, so that the light may be removed from the windshield and carried to practically any part of the machine, or mounted upon a post at the side of the road for camping purposes. The light should prove very convenient for making roadside repairs and adjustments.

A conventional windshield clamp is mounted on the shield and to it is fitted an ornamental bulb in which is mounted the wire upon the reel. At the top of the fixture the spot light is mounted and so designed that it may be clamped in practically any position.

Both the lamp and bracket are finished in black enamel and the lamp is fitted with either clear or non-glare lens, backed by a 21 candlepower nitrogen lamp in a silvered parabolic reflector. A switch is mounted at the back of the lamp. In addition to the regular equipment a 3½-inch reducing mirror may be had if desired at a slight addition in cost.

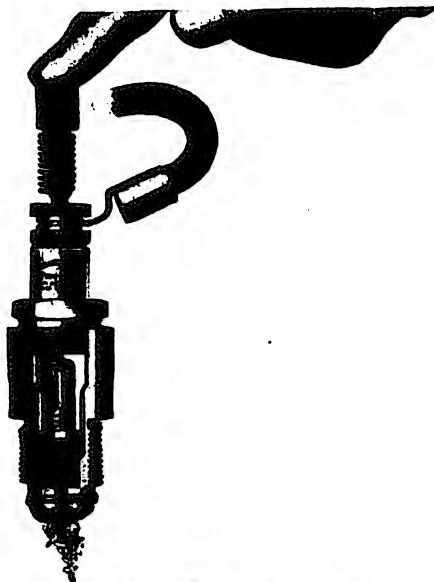
Manufactured by Anderson Electric Specialty Co., 562 W. Van Buren St., Chicago, Ill. Price without mirror, \$7.50; with mirror, \$8.

PUSH CLEAN SPARK PLUG.

It is an undisputed fact that the functioning of a gasoline engine is entirely dependent upon the action of the spark plug. If this useful device is broken, short circuited, or covered with carbon and oil, it makes no difference how well the rest of the machine is working, the engine will not give results.

The Push Clean Spark Plug is an innovation in spark plug design. It is both new and unique, and claimed to be 100 per cent. efficient. This device consists of the conventional base, porcelain and centre electrodes. The feature is the movable centre electrode, which is so constructed that by pressure upon the insulated top it may be pressed down, scraping away the carbon from the inside of the porcelain, as well as from the spark gap.

Two seconds time will suffice to clean



Push Clean Spark Plug.

all four plugs, as there is no necessity for their removal from the engine. The illustration gives a clear idea of the construction.

Manufactured by Wellman-Howe Manufacturing Co., 21 E. Van Buren St., Chicago, Ill. Price \$2.

THE WHITNEY GAS HUMIDIFIER.

A device designed to act as a carbon eliminator and to prevent its formation has just been put on the market under the name of Whitney Gas Humidifier.

But one connection is made, and that is with the intake manifold, the humidifier is then filled with water and the engine started. The humidifier adjusting valve is next opened and the engine speeded up to several hundred revolutions per minute, drawing in water through the manifold, and driving out the carbon, which is softened by the action of the water vapor.

After the carbon has been removed from the engine the adjusting valve is turned so as to allow but a small part of the water to enter the manifold. It is said that with the valve thus adjusted one filling of the tank will last for several hundred miles. As soon as the tank becomes emptied a valve automatically closes, preventing the entrance of air into the manifold.

Manufactured by the R. S. Whitney Manufacturing Co., 74 Nichols St., Lewiston, Me. Prices, size No. 1, \$7.50; No. 2, \$9.50.

THE BURKE CONDENSER.

Every automobile owner who has used alcohol in the radiating system to prevent the freezing of the water in the winter knows that the alcohol must be replaced frequently or the solution will be weakened by evaporation.

With the engine temperature at normal this evaporation is reduced to a minimum, but as the circulation commences and the liquid is heated, evapora-

tion commences and the alcohol is quickly dissipated through the vent tube.

To prevent this dissipation the Burke condenser may be attached to the radiator filler cap and the vent tube closed. When this is done all vapor must pass into the condenser.

This condenser is made upon the same principle that the old "Moon Stills" were and consists of a coil of tube which is cooled by the action of the air through which the automobile is passing.

As the cooling liquid is heated the alcohol evaporates and rises to the condenser, where it is cooled and condensed in the coils, dropping back into the cooling system again.

Manufactured by Automobile Devices Co., 1619-1621 Sanson St., Philadelphia, Pa. Standard Model, \$10; Little Giant, \$5.

SINGER AUTO TRAFFIC SIGNAL.

It is an interesting study to note the various signals adopted by automobilists in congested traffic conditions. No two methods seem to be alike. A hand thrust forth from the driver's side may denote, stop, turn to the left or turn to the right. Doubtless many accidents would be averted if a universal signaling system were adopted.

The Singer Auto Traffic Signal, which is now being manufactured, is designed to prevent traffic confusion and provide a suitable signal which is positive in action and easily interpreted.

This device consists of two electrically lighted boxes, one at the front of the car, the other at the rear, in which are carried five signs, Ahead, Right, Left, Stop and Back. These signs are controlled by a circular switchboard located on the steering column directly beneath the wheel.

When the driver of the car wishes to stop he simply presses the stop button and the signal Stop appears in both boxes. This same signal is automatically displayed upon application of the service brake. The other signals are operated in like manner and as all of the buttons are interlocking, but one signal can be displayed at one time.

Manufactured by Singer Auto Traffic Signal Co., 2827 Locust St., St. Louis, Mo. Write for prices and descriptive literature.



Whitney Gas Humidifier.



Application of Singer Traffic Signal.

PLATE XIII.

GARAGE WITH CHAUFFEUR'S ROOM OVERHEAD

Substantial Brick Structure Houses Two Cars and Has an Ample Large Upper Room Finished Off at Moderate Cost

Designed by the Architectural Department of The Automobile Journal Publishing Co.

FOR motorists who employ a chauffeur and keep two cars, adequate garage facilities are an economy in the long run and greatly increase the enjoyment to be derived from the motor car, as the owner experiences the peace of mind that comes from knowing that his car is well housed and maintained, and that it is always close at hand and also the chauffeur, if provision is made for the latter.

With the principal structural material, brick, the builder has a choice of a number of finishes that could be selected to match the home. The outside walls are 10 inches thick, with a two-inch air space, and start from the concrete underpinning, which is carried nine inches above grade and formed of concrete as an extension of the foundation walls, also of concrete. Two 12-inch granite tops fit over the entrances in front, balancing the underpinning and adding greatly to the finish of the building. The interior partition walls are four inches thick and of brick. These latter partitions wall off the stairway, coal bin, heater room and toilet from the garage proper.

An ideal arrangement is found in the location of the heater room, as it calls for very little piping to install the radiators in the proper positions. With the two car heating system one series of radiators should be placed on the garage side of the heater room partition and the other on the same side of the coal bin partition, where they will be close to the radiators of the cars when the latter are in the building, assuring warmth even on the coldest nights and an easy starting engine at all times.

Three spacious windows on either side afford ample light for working at the benches and additional ventilation in summer time is provided through two windows in the rear, opening into the heater room and toilet respectively. On the second floor light and air is admitted to the chauffeur's quarters through dormer windows front and rear, each having double sashes.

Two main entrances, each eight feet wide, enable the drivers to run the car directly into the position where it is to be left and run it out again without the difficulty of manouvering it about inside the building. A door on the side opening from the outside directly in front of the stairway gives access to the building without opening the main doors and serves to conserve the heat, and a partition could be built at slight expense making this entrance direct to the chauffeurs quarters

with a second door leading into the garage, serving to prevent the odors of the gas and oil from reaching the second floor.

The foundation walls, which extend three and a half feet below level, are made of concrete 12 inches thick of a mixture of one part cement, two parts sand and four parts gravel or crushed stone. These walls should be extended inside for the chimney foundation and also for the brick interior partitions. Various toilet and drain connections are allowed for in placing the walls and before the cement floor is laid.

A heavier tamper should be used in tamping down the ground inside the walls before the floor is laid. In casting the floor two mixtures should be used, the first, three inches thick, of one part cement, two parts of sand and four parts of crushed stone; the second, one inch thick, of one part cement and two parts sand. In the garage part the surfaces of the floor should be sloped toward the drains to carry off the water readily.

The first floor ceiling is made of plaster laid on metal lathes, nailed to the floor joints, making it fireproof.

The second floor timber specifications are as follows: Floor joists, 2x10 inches, set 16 inches on centres and notched in brick work; flooring, seven-eighths inch hard pine; plates of 2x6 inch spruce, bolted into brick work; hip rafters, 2x10 inches; jack rafters, 2x16 inches; roofing boards, seven-eighths spruce laid two inches apart.

The second floor partitions which wall the living quarters off from the roof members are made of finished off wall board or sheathing nailed on 2x4 inch studs, 16 inches off centre. An ample large room is formed, 24 feet long between the dormer windows and 15 feet wide in the centre, with a small hall leading off to the stairway.

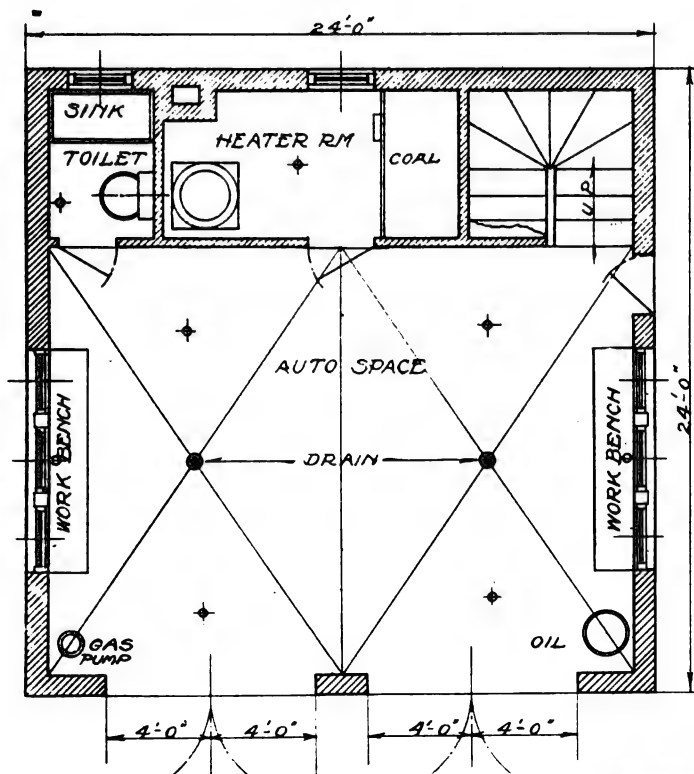
Extra shingles, nailed with galvanized nails, should be used on the roof and dormer roofs and all exterior woodwork should be of white pine stock, seven-eighths of an inch thick. Spruce risers and treads of the same thickness are used in the stairway leading to the upper floor, which has an eight-inch rise.

When finished the owner has a garage that should last a life time; one that is practically fireproof and with a minimum cost for maintenance. With normal labor and material costs the building completed according to the design should not cost over \$2500.

PLATE XIII

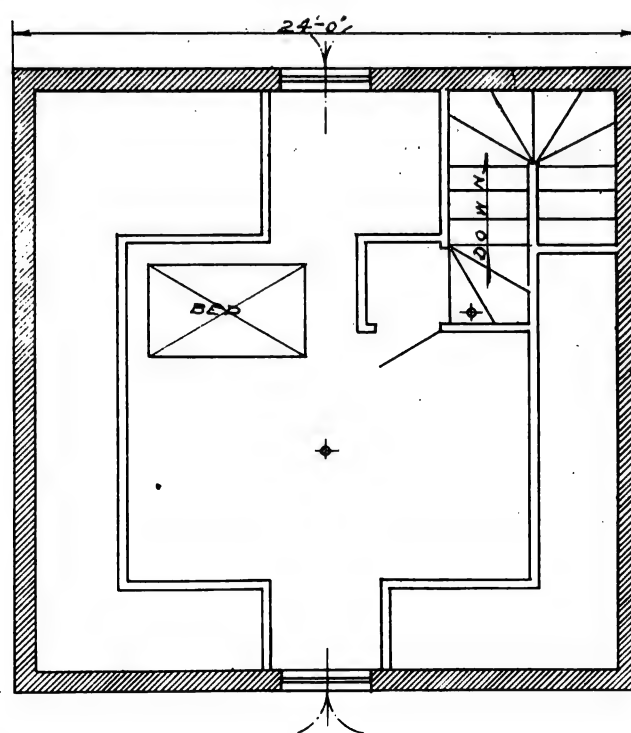


ELEVATION
SCALE



1ST FLOOR PLAN

SCALE



2ND FLOOR PLAN

Advance Notes of Big Shows

New York and Chicago National Automobile Exhibitions Preparing Elaborate Stagings.

NOTWITHSTANDING the curtailment in motor car production that is in prospect, there is every indication that the New York and Chicago National Automobile Shows will be the largest and most elaborate on record. There will not only be a larger number of exhibitors than ever before in any show in the world, but also a larger number of exhibits, as indicated by the show statistics recently given out by S. A. Miles, manager of the national shows.

The National Automobile Chamber of Commerce and the Motor and Accessory Association allotted space to members several weeks ago and since that time announcement has been made of the additional exhibitors of both cars and accessories who will exhibit and who are not members of either of the associations.

At the New York show, which will be held in Grand Central Palace, Jan. 5-12, there will be 13 new exhibitors of cars and 127 new accessory exhibitors, making a grand total of 95 cars and 245 exhibitors of accessories. All the space on the entire four floors of the building will be taken. The Chicago show will be held from Jan. 26 to Feb. 2 and the number of exhibitors is slightly larger than for the New York exhibition. Some idea of the great growth of the industry and the expansion of the show as an institution is shown in these figures, as 18 years ago, when the first show was held, there were only 51 concerns exhibiting.

The new exhibitors of cars allotted space are as follows: American Motors Corp., Anderson Motor Co., Camden Motors Corp., Comet Automobile Co., Dixie Motor Car Co., Inc., Doble-Detroit Steam Motors Co., Harroun Motors Corp., Malbohm Motors Co., Monitor Motor Car Co., Moore Motor Vehicle Co., Olympian Motors Co., Pan-American Motors Corp. and Stanley Motor Carriage Co.

The following makes of cars, as members of the National Automobile Chamber of Commerce, will exhibit at the shows: (Gasoline) Abbott, Allen, Apperson, Auburn, Austin, Briscoe, Buick, Cadillac, Case, Chalmers, Chandler, Chevrolet, Cole, Columbia, Crow, Davis, Detroit, Dodge, Dorris, Dort, Elgin, Elkhart, Empire, Flat, Franklin, Grant, Glide, Hackett, Hal, Haynes, Hudson, Hupp, Interstate, Jackson, Jordan, King, Kissel, Kline, Lewis, Lexington, Liberty, Marion-Handley, Marmon, Maxwell, McFarlan, Mercer, Mitchell, Moline, Monroe, Moon, Nash, National, Oakland, Olds, Overland, Owen, Packard, Paige, Paterson, Peerless, Pierce-Arrow, Premier, Regal, Reo, Roamer, Saxon, Scripps, Standard, Stearns, Stephens, Studebaker, Stutz, Velle, Westcott, Willys and Winton; (electrics) Anderson, Baker, Milburn, Ohio and Wood.

The Glide, Dorris, Hackett and Stephens will be shown at Chicago only, while the Kline will be exhibited at New York only.

NEW COMPANY WILL BUILD LAUREL 16-VALVE CAR.

The Laurel Motors Corporation, which has taken over the Laurel Motor Co. of Richmond, Ind., is planning the purchase of the former Remy experimental plant at Anderson, Ind., and will manufacture the Laurel car with a new type of motor. The engine will have the Roof 16-valve head, which was developed by R. M. Roof, who has been manufacturing the

head for Ford cars during the past year. The new company will also make engines under the Roof patents for other makes of cars and also the Roof 16-valve head for Fords. The new Laurel car will be on the market shortly after the first of the year. Officers of the Laurel Motors Corporation are: President, W. H. Maston; vice president and general manager, C. E. Hayes; secretary and treasurer, Grant L. Hudson.

WILL HAVE TO PAY TAX ON PASSES TO AUTO SHOWS.

The Internal Revenue Department at Washington, D. C., has ruled that the war tax on admissions to theatres and halls applies to passes for the automobile shows. The only persons exempt are municipal officials on official duty and employees of the show.

As the admission price to the shows is 50 cents all passes will have to pay on that basis or five cents for the tax.



SHOWS.

Akron, O., automobile show....Dec. 3-8
 New York, automobile salon, Hotel Astor.....Jan. 2-9
 New York, 18th annual automobile show.....Jan. 5-12
 Washington, D. C., carnival and open house week.....Jan. 11-18
 Providence, R. I., automobile show.....Jan. 11-19
 Philadelphia, 17th annual automobile show.....Jan. 11-19
 Rochester, N. Y., 10th annual automobile show, Exposition Park..Jan. 14-19
 Milwaukee, Wis., automobile show....Jan. 18-24
 Montreal, Can., automobile show.....Jan. 19-26
 Cleveland, O., 17th annual automobile show.....Jan. 19-27
 Scranton, Pa., automobile show Jan. 21-26
 York, Pa., automobile show..Jan. 21-26
 Portland, Ore., automobile show.....Jan. 21-26
 Mifflintown, Pa., automobile show.....Jan. 22-26
 Allentown, Pa., automobile show.....Jan. 23-28
 Chicago, Ill., national automobile show.....Jan. 26-Feb. 2
 Chicago, Ill., salon; Congress hotel..Jan. 26-Feb. 2
 Harrisburg, Pa., automobile show....Jan. 26-Feb. 2
 Manchester, N. H., academy Jan. 28-Feb. 2
 Minneapolis, Minn., automobile show.....Feb. 2-9
 Kansas City, Mo., automobile show.....Feb. 9-16

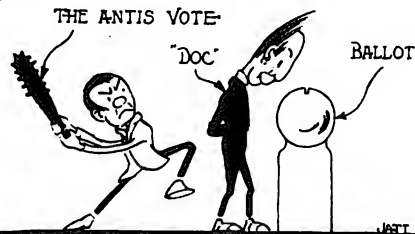
Kansas City, Mo., third annual tractor show.....Feb. 11-16
 St. Louis, Mo., automobile show Feb. 11-16
 Newark, N. J., automobile show.....Feb. 16-23
 San Francisco, second annual automobile show.....Feb. 16-24
 Waterbury, Conn., automobile show.....Feb. 18-23
 Des Moines, Ia., automobile show.....Feb. 18-23
 Syracuse, N. Y., automobile show....Feb. 18-23
 Grand Rapids, Mich., automobile show.....Feb. 18-23
 Springfield, O., automobile show.....Feb. 18-23
 Pittsfield, Mass., automobile show....Feb. 18-23
 South Bethlehem, Pa., car and truck show.....Feb. 18-27
 Brooklyn, N. Y., motor vehicle show..Feb. 22-March 9
 Omaha, Neb., automobile show.....Feb. 23-March 2
 Boston, Mass., Boston Automobile Dealers' Association show.....March 2-9
 Trenton, N. J., automobile show.....March 20-23
 Stockton, Cal., automobile show.....April 9-13

MEETINGS.

New York, Automobile Electrical Association.....Jan. 3-4
 New York, Society of Automotive Engineers, annual.....Jan. 9-10
 New York, National Association of Accessory Jobbers.....Jan. 11-16

Graphic Items From the Fortnight's News

The Automobile Club of Maryland enlivened an off year politically by staging a hot election of its own, getting up an anti-administration ticket to be put in the field against the re-election of Dr.



H. M. Rowe as the president of the club. The "antis" based their opposition, according to the statement of their circular, on the existence of considerable disaffection between the club and the state authorities as a result of Dr. Rowe's attitude on the Adamson bill.

In Massachusetts car thieves adopted a most strenuous expedient to cover up their crime. After driving a stolen car into a wooded section a hole was dug and after the car had been driven into its specially prepared grave it was covered up with dirt. The fact that the windshield was left above the ground led to its discovery by some boys.

The Ford Motor company during the month of October produced 79,675 cars, making a total for the past six months of 469,135. Despite this heavy production, which is at the rate of over 900,000 cars a year, the company is still some 100,000 cars behind in orders.

Iowa now has one motor car for about every nine of its inhabitants, the registration to date in that state being over 277,000 cars.

Police graft investigations, so popular a few years ago, are such a decided rarity now that to find one popping up in Greater New York is some consolation to motorists who have suffered. Motorcycle cops in Central Park were doing nicely against the high cost of living, it is maintained, holding up motorists and taking bribe money to avoid summons. After repeated bleedings a number of



autoists have bared the practise to an extraordinary grand jury.

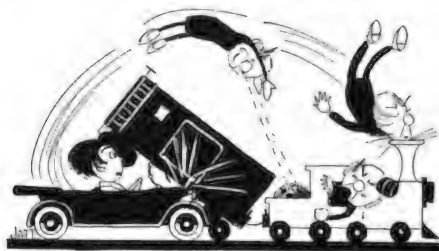
Some of the girls who have been driving the ambulances in the war zone have become very expert in both driving and

making repairs. Many are capable of entirely disassembling and assembling their machines should it become necessary.

In Milwaukee, for motor car theft recently, a six-year sentence was imposed on a youth named Leo Wojcieszowski, which should give Woj ample time to read the war news from Russia.

Pacifists in America would be even more pacific if they could witness the results that follow the explosion of some of the large shells on the French front and would realize that Germany has challenged us to something besides a ping pong game. In one of the cities in Flanders, located amid the active operations, a large shell struck beneath a motor car and after penetrating the ground for several feet, exploded. A wide crater was made in the street, an adjacent house nearly wrecked and the motor car was found located on the edge of a roof, over 20 feet up in the air.

No, gentle reader, this isn't the Kiralfy troupe doing their famous acrobatic



act, nor the magic cabinet act of Black Crook and other extravaganzas of those happy days back in the other century. It represents an automobile party at 1 a. m. ramming a freight between Holley and Albion, somewhere in the United States. Several couplings were broken and one more Liberty bond was put in circulation.

The Meridian Highway Association at its annual meeting recently voted to extend the road through Wisconsin and Michigan to Lake Superior.

The girls on motor row in Chicago gave a tobacco shower in honor of the soldiers and sailors on duty or waiting for orders to leave the training camps in this country. Less than a month ago they organized the American Business Girls' Patriotic League. They now have to their credit more than 700 members in Chicago alone, besides several shipments of "smokes" for the American fighters in France. The organization is not confined to Chicago. Applications for membership flooded in from East, West and South, and the expectation is that the league will soon be national in scope. At their first tobacco shower hundreds of smoking kits of cigars, cigarettes, pipes and "the makin's" were brought to the Hotel Metropole.

Several suggestions have been offered, toward the establishment of a "Carless Day" as a means of diverting a million barrels or so more of gasoline to the Allies now and then. If it comes to that



there are some so attached to wheeling that they just won't walk anyhow.

No patriotic citizen in this land would choose to have our army face the Kaiser's fighting machine single-handed just for the lack of a little help on the food saving campaign. It is necessary that the Allies be fed to uphold their stamina. With a normal consumption at home we will have 77,500,000 bushels of wheat to send abroad this year. We actually need 400,000,000 bushels for export. Some of this difference must be saved by denials and wheatless days. We normally have no sugar for export. This year we must find 100,000 tons before Jan. 1. If every person will save a teaspoonful of sugar at each meal there will be plenty of surplus sugar for export.

Automobile manufacturers don't guarantee their cars when they are stored on the bottom of the ocean for several months, but notwithstanding this fact a purchaser was found for a King Eight touring car after it had undergone such an experience. The car was part of a shipment in transit to Russia via Vladivostock aboard a boat that was shipwrecked on the Chinese coast. The car was salvaged from the ship after it had been under the water for three months and was sold at auction to an English merchant at Hongkong. He overhauled the machine and it ran perfectly on the first trial.

Mr. McChesney gets exceedingly lonesome in a tank town, as any traveling salesman will tell you. One of them moored in a place on the Connecticut circuit a few evenings since hit on a rather



unusual idea to break the spell. He dropped in at the police station, coaxed the chief into giving him rides around town in the motor patrol and imagined it was Saturday night.



Rubber Club of America, Guests of H. S. Firestone at Akron, O., Recently. From Left to Right: First Row Seated, R. J. Firestone, H. S. Vorhis, W. E. Brwyn, C. T. Wilson, W. O. Rutherford, H. S. Firestone, G. B. Hodgman, W. J. Kelly, V. H. Cartwell, P. W. Litchfield. Second Row, Standing, E. B. Davis, Ernest Hopkinson, E. E. Huber, W. G. Ryckman, L. E. Sisler, H. T. Dum, F. R. Henderson, G. A. Luddington, P. E. Young, R. L. Rice, L. M. Stadelman, R. E. Glass, A. H. Brown, M. E. Ake, H. W. Smith, J. G. Robertson. Third Row: A. G. Partridge, Jesse E. LaDow, H. J. Adams, T. C. Marshall, J. W. Thomas, S. G. Carkhuff, C. B. Raymond, R. E. Lee, Russel Parker, H. K. Raymond, J. C. Weston, Seneca Lewis, A. B. Jones.

The Business Side of the Motor Vehicle Industry

H. S. Firestone, president of the Firestone Tire and Rubber Co., Akron, O., who also served two years in the presidency of the Rubber Association of America, entertained the directors and standing committee of that organization in Akron on Saturday and Sunday, Nov. 17 and 18. The guests from the eastern part of the country who arrived Saturday morning, visited the Firestone rim and rubber plants and Firestone park, later taking luncheon in the Firestone club house. In the afternoon a visit was made to O. C. Barber's farm, the army football game. In the evening dinner was served at the Portage Country Club. President F. H. Goff of the Cleveland Trust Co. spoke on "The Relations of Finance to the Rubber Industry" and Edgar B. Davis, managing director of the United States Rubber Co., who spent many years in the Far East developing rubber plantations also spoke. The party remained over Sunday as the guests of Mr. Firestone at his home.

The Guaranty Securities Corporation of New York City, formerly located in the Equitable building, have moved into their new banking offices at Madison avenue and 38th street, known as 244 Madison avenue. The new quarters are much larger than the old ones, including the ground floor, second floor and basement of the building.

The Dort Motor Truck Co., Waterloo, Ia., has appointed three new district representatives to its organization, which is being expanded to bring the factory in closer touch with the dealer and consumer. W. A. Baxter, formerly with the Maxter Co. of Chicago, will have charge of New York state, Eastern Pennsylvania and New England. E. W. Brooks, re-

cently with the Available Motor Truck Co., has been placed in charge of the Illinois, Indiana, Ohio and Western Pennsylvania, and S. B. Knudson will represent the company in the territory of Iowa, Missouri, Kansas and Nebraska.

The Akron Biltwell Tire and Rubber Co., Akron, O., has been formed in that city with an authorized capital of \$200,000 to engage in the manufacture of automobiles, tires, tools and accessories. The officers are: President and general manager, M. Braley; vice president, W. M. Graham; secretary and treasurer, J. F. Risch.

The Reading Chassis and Motor Corporation has been organized with \$10,000 capital to manufacture motors, automobiles and cyclecars. S. S. Shears, Brighter Hotel, Reading, Pa., and E. Cahn, 233 Broadway, New York City, are the incorporators.

The Harroun Motors Corporation, Detroit, Mich., during the week of Nov. 5-10 shipped 25 cars. The company has about 300 completed motors on hand and is experiencing no stringency in either materials or labor.

James M. Crawford has been appointed chief engineer of the Allen Motor Co., Fostoria, O., and Clyde C. Cox has been appointed as his assistant. Mr. Crawford was formerly assistant chief and designing engineer of the Chalmers Motor Corporation and Mr. Cox was associated with him.

The Studebaker Corporation of America, recently announced the appointment of three new managers in the Metropolitan territory of New York. Fred L. Sanford, who started in the automobile business in Worcester, 12 years ago, has been appointed retail manager of the

company in New York city and Albert B. Christie, formerly assistant manager of the Brooklyn branch, has been appointed manager. The other appointment was that of Everett E. Bell as manager of the used car department of the Studebaker Corporation in Manhattan.

The Chandler Motor Car Co. for the 10 months ending Nov. 1 reports net earnings equal to \$32 per share before deducting war taxes. President C. F. Chandler made the following statement:

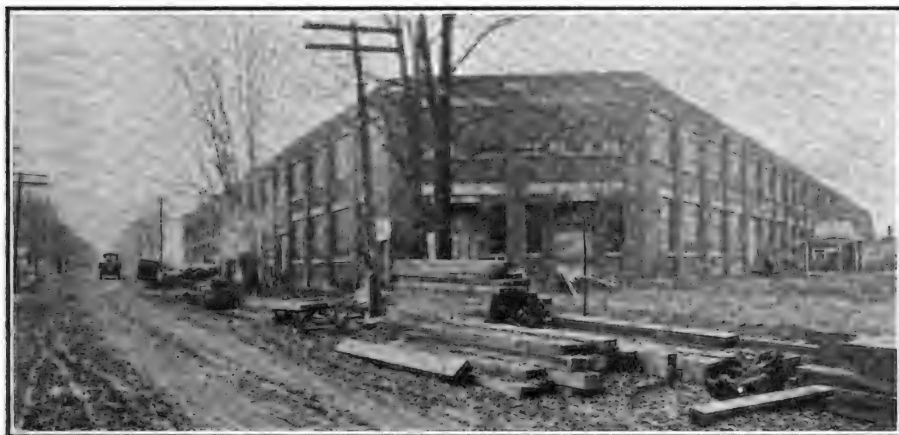
"I estimate that for the completed year of 12 months the earnings per share as above will amount to not less than \$34.50 per share.

"We estimate the maximum figure which must be paid to the government in the shape of war taxes to be about \$9.50 per share. After \$13 per share has been paid in dividends this will leave about \$12 per share to be placed to the credit of surplus account.

"Chandler Motor Car Co., which has only one class of stock and has no preferred stock or bonds or notes, is entirely free and clear of debt, with all merchandise and other bills paid, and in addition to this the company has a cash balance of over \$900,000 in the bank.

"The company is fortunate in having inventories (entirely paid for) at prices much below the present market, which will take care of our operations well into next year."

The Wagner Axle Co., Anderson, Ind., has bought the plant of the De Tamble Motors Co. at Indianapolis, Ind., and will manufacture a worm drive axle. Renovation work and installation of equipment for the new manufacturing operations is now in progress at the plant.



The New Factory of the Duplex Truck Co. at Lansing, Mich., Which Will Be Ready for Operating About Dec. 1.

The Duplex Truck Co., Lansing, Mich., is installing machinery in its new factory building, which is to be occupied about Dec. 1. With this addition working to capacity the maximum plant production will be approximately 300 trucks a month, or 3600 a year.

J. C. Ayers has been appointed vice president of the Denby Motor Truck of Detroit, Mich., and will have charge of sales and advertising. He is one of the pioneers in the commercial car field. His first experience in the business was as assistant sales manager of the Rapid Motor Vehicle Co., and he later joined the General Motors organization as a branch manager in Detroit of the General Motors Truck Co. He was later promoted to the position of manager of the sales promotion department at the factory. About two years ago he severed his connection with the company to form the retail firm of Towar-Ayers Co. in Detroit as truck distributors.

The Columbus Varnish Co., Columbus, O., makers of Peerless Automobile Specialties, is mailing out the semi-annual trade circulars to 20,000 dealers, garage men and motor car supply houses. The Peerless line includes Peerless Anti-Freeze, Peerless Carbon Remover, Peerless Tire Paint, liquid wax, cushion dressing, enamels, shellacs, Japans and other products. A partial list of the users and indorsers of Peerless products is given on the circular, which will be mailed to anyone upon request. The company has a comprehensive and efficient sales service, which it renders to its dealers.

L. Goldstein Sons, Philadelphia, and a New York syndicate represented by Michael Levy and Josef Frankel, who purchased the assets of the Pullman Motor Car Co., including the plant at York, Pa., have completed negotiations for a resumption of manufacturing operations at the plant on an extensive scale.

The Hartford Machine Screw Co., Hartford, Conn., has completed additions to its plant so that it now covers more than 200,000 square feet of floor space with the manufacture of the widely and favorably known Master calorite spark plugs and Master power driven tire pumps, besides a long list of screw machine products.

George H. Dunham, president of the Society of Automotive Engineers, has been elected vice president of the Millitor Co. of New York and has moved to that city. The company was formerly the Militaire Motor Vehicle Co. of America, Inc., of Buffalo, N. Y., but the name has been changed to Millitor and a factory has been purchased at Elizabeth, N. J.

The Philadelphia Storage Battery Co., manufacturers of the Philadelphia Diamond Grid batteries, have opened a branch office and depot at 37 Spear street, San Francisco, Cal. This is the second branch established in that state within a year and will be in charge of A. P. Clark. The Los Angeles branch is in charge of Arthur Affeld. C. L. McWhorter, manager of the Pacific coast division, will make his headquarters at the San Francisco branch.

The H. B. Shontz Co., Inc., New York City, recently organized by H. B. Shontz, its president and general manager, who was formerly sales manager of the P. J. Durham Co., has been appointed distributor in the Metropolitan district for U. S. L. storage batteries and the three-story building at 157 West 44th street will be used for a battery service station.

The Prest-O-Lite Co., Inc., Indianapolis, Ind., has announced the following list of acetylene distributors: Brandel & Lietman Battery Service Co., Owosso, Mich.; Frank W. Derby & Son, Athol, Mass.; Andry's Garage, 45-49 Broadway,

Long Branch, N. J.; Electrical Construction Co., Racine, Wis.; C. F. Yeakel, 643-45 E. Broadway, Alton, Ill.; Auto Supply and Accessories Co., 16 S. La Salle St., Aurora, Ill.; Herrick Auto Supply Co., Inc., 401-5 East St., Bloomington, Ill.; Jackson Motor Car Co., Inc., 1306-8 Washington Ave., Cairo, Ill.; Herrick Auto Supply Co., 113 W. Park Ave., Champaign, Ill.; F. C. Higgins, 567 Rush St., Chicago, Ill.; Vesely Brothers, 3819 Ogden Ave., Chicago, Ill.; West End Auto Garage, Chicago, Ill.; Wilson Ave. Garage Co., 4551 Kenmore Ave., Chicago, Ill.; Woodlawn Motor Car Co., Chicago, Ill.; George W. Brokhausen, 170-4 Galen St., Freeport, Ill.; Hay Brothers, 201-3 N. Chestnut St., Kewanee, Ill.; Tri City Electric Co., 525 Main St., La Salle, Ill.; Marion Auto Tire and Battery Station, 507 W. Main St., Marion, Ill.; Arthur L. Johnson, 130 W. Madison St., Rockford, Ill.; Auto Service Co., 109 N. Bloomington St., Streator, Ill. The following list of battery service stations has also been announced by the Prest-O-Lite Co.; Overland Garage, Red Wing, Minn.; Ferguson Brothers, 12th St., Miami, Fla.

D. C. Durland, one of the vice presidents of the General Electric Co., has been elected president of the Mitchell Motors Co., Racine, Wis., to succeed Otis C. Friend. This announcement was made simultaneously with that of the fact that R. C. Rueschaw, who recently resigned as sales manager of the Reo Motor Car Co., had been elected vice president of the Mitchell company.

The Fabrica de Automobiles has been organized at Monterey, Mexico, and incorporated in that country with an authorized capital of 600,000 pesos, or about \$300,000, and will manufacture motor cars. The company was promoted by Luther L. Lane, Brownsville, Tex., acting president.

Harry Ford, president of the Saxon Motor Car Corporation, is taking a long vacation while the managerial affairs of the company are being taken care of by Charles Woodruff, formerly purchasing agent of the Chalmers Motor Co.

The Comet Automobile Co., Decatur, Ill., expects to occupy the first unit of its new plant about Dec. 15. This new factory is said to be one of the most modern and best equipped in the middle west.



Factories of the Hartford Machine Screw Co., Hartford, Conn. With Recent Additions the Company is Now Occupying More Than 200,000 Feet of Floor Space.

Overhauling *The* Automobile



General Engine Repairs

This is the 10th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 11th article of this series will appear in the Dec. 10th issue of the Automobile Journal.

UP TO the present time the articles in the Automobile Journal relative to overhauling have been devoted to specific cars and the information has, as a rule, been applicable only to particular designs.

To make a resume of past articles, present additional points and give general directions for some of the engine repairs that may be applicable to any make or type of car, the present article is inserted in the series.

From time to time we receive letters from our subscribers complaining of excess carbon deposits in the explosion chambers, and the general belief seems to be that improper lubrication is the principle cause. This may be true in many cases, but is not infallibly the rule. In the majority of cases carbonization is due entirely to imperfect combustion of the fuel used. The gasoline of today contains a large per cent. of kerosene, and as its vaporizing point is high, carburetors which were primarily designed for lighter fuels do not vaporize the fuel properly and the mixture goes into the cylinders in a wet vapor.

Formation of Carbon Deposits.

Not all of this wet vapor is blown from the engine through the exhaust, some of it is turned into carbon and deposited on the walls, the valves and in the firing chamber. The bal-

ance remains as a liquid and condensing on the walls dilutes or cuts the lubricant and escapes into the base, where it mixes with the lubricating oil and sooner or later, unless drained from the engine, accumulates to such an extent that the lubricant ceases to do its work. As the lubricant is diluted it escapes into the explosion chamber and is deposited in the form of carbon or blown through the exhaust.

Since the automobile owner cannot obtain a high grade of fuel for his engine, he cannot hope to remove the cause for carbonization. He can only adopt certain preventative measures and devices by which he can obtain at least a part of the engine efficiency.

As a precaution against the burning out of bearings and the scoring of cylinders, every owner should use the greatest care in keeping the lubricating system to its efficiency. By doing this he is beginning the fight against the carbon evil.

Periodical Changing of Oil.

At least once every week the lubricant should be examined and as soon as it begins to show signs of dilution, discarded and new oil put into the system. Just how often new oil is needed depends upon the engine, the fit of the pistons and rings and the quality of lubricant.

If the oil system is of the force feed type, it should be cleaned once every season. The oil tubes should be flushed with kerosene and the deposits scraped from the inside walls of the pipes with soft copper or iron wire.

With the oiling system working at its maximum efficiency and the lubricant undiluted with kerosene or fuel, the first step in the elimination of carbon from the engine has been taken.

Five Ways to Remove Carbon.

Five methods of removing carbon from the engine are open to the owner.

1. For light deposits removal may be accomplished by the addition of pure kerosene in either of two ways. The most efficient method and advisable because it does not tend to dilute the oil in the crank case is applied as follows: After the engine has been run for four or five minutes and thoroughly warmed, drop about a tablespoonful of kerosene into the auxiliary air intake of the carburetor with a medicine dropper. Immediately afterward, place a like amount of water in the air intake. Alternately apply kerosene and water in the same way until about six tablespoonfuls of each have been used, and run the engine until all traces of smoke have disappeared from the exhaust. If this remedy is applied once a week the carbon is kept within control and does not have a chance to harden on the piston heads.

2. The second method of applying kerosene consists of pouring about half a cupful of kerosene into each of the cylinders before leaving the car for the night, while the engine is still hot. The kerosene has a tendency to dissolve the carbon, which is blown through the exhaust when the engine is started in the morning. The big disadvantage of this method is that the kerosene will filter by the pistons and dilute the oil in the base.

Carbon Removing Preparations.

3. Under the third method of carbon removal may be considered such liquid and powder carbon removers as are now



Scraping Carbon from Pistons of a Removable Head Engine.

on the market. Some of these are designed for application directly to the engine, others for mixing with the gasoline. The action differs. In some cases it is similar to that of kerosene, in others, the principle is the addition of volatile liquids which have a tendency to burn off the carbon deposits.

4. The fourth method which is applicable in all cases is that of scraping. With removable head engines it is an easy matter to scrape the carbon from the cylinders, valve pockets, and piston heads, with either a putty knife or screw driver. With block type engines, not fitted with removable heads, the spark plug and valve covers may be removed and flexible scrapers inserted in the cylinders.

Where carbon is being scraped from the engine by this system, two points are to be observed; first, that the piston is at the top of its stroke or nearly so, in order that the polished walls of the cylinders are fully protected; and, second, that the valves are both seated, to prevent the carbon scrapings from working into the valve guides and manifolds. Frequent applications of kerosene tend to soften the carbon and make its removal easier. A compressed air blast or tire pump may be used to blow out the carbon when it has been loosened from the cylinders.

The Garage Man's Method.

5. The fifth and last method is being generally adopted and when properly applied is very efficient. It is called carbon burning, and consists of igniting the carbon in the presence of pure oxygen, when it will burn or crackle away from the metal very rapidly. As this is a repair or garage man's process we will not go into it in detail.

As said before, there are certain carbon preventative measures that may be adopted which tend to increase engine efficiency, where low grade of fuel is used.

In the first method of carbon removal we suggested the addition of water to the intake. That the introduction of water vapor into the engine has a tendency to remove carbon has been shown by exhaustive experiments carried on by many engineers. Hence, acting upon this principle, there are a number of devices on the market which are designed to supply the engine with a predetermined amount of water vapor as a preventative to carbon deposit.

In itself water is not either a preventative or remover of carbon. It is only efficient in vaporous form. A foggy vapor is not as efficient as a dry or superheated gas, and for that reason much depends upon the design of the water vaporizer. The owner should be careful to obtain a device that actually furnishes water vapor, rather than pure water, to the carburetor or manifold.

Care in Use of Water Vaporizer.

Another point to be considered is the installation of such a device, for the design of the intake or carburetor will have an effect upon the functioning of the vaporizer. Unless the device is fitted with a check valve or other means for controlling the amount of vapor to be admitted to the cylinders, it should not be applied to the manifold between the throttle valve and the engine. The reason for this is that with the throttle closed the vacuum in the intake will be increased and the engine will "load up" on water vapor.

Piston Rings Should Be Compressed When Replaced by Means of a Ring Compressor Tool.

The proper application of heat, either to the air intake, or to the manifold is in a sense a carbon preventative. Different devices of this type are described in the heating story published in this issue.

By adopting some or all of the above directions the owner will find in a majority of cases that carbon deposits are reduced to a minimum. If the trouble still persists he may be pretty sure that the engine is at fault and look for scored cylinders, poorly fitted pistons or faulty piston rings.

Overhaul for Scored or Worn Cylinders.

Scored cylinders or cylinders worn out of round may be evidenced by lack of compression. A comparison of the power required to turn the crankshaft over by the hand crank, with all but one of the spark plugs removed, is the simplest test for locating the faulty cylinder.

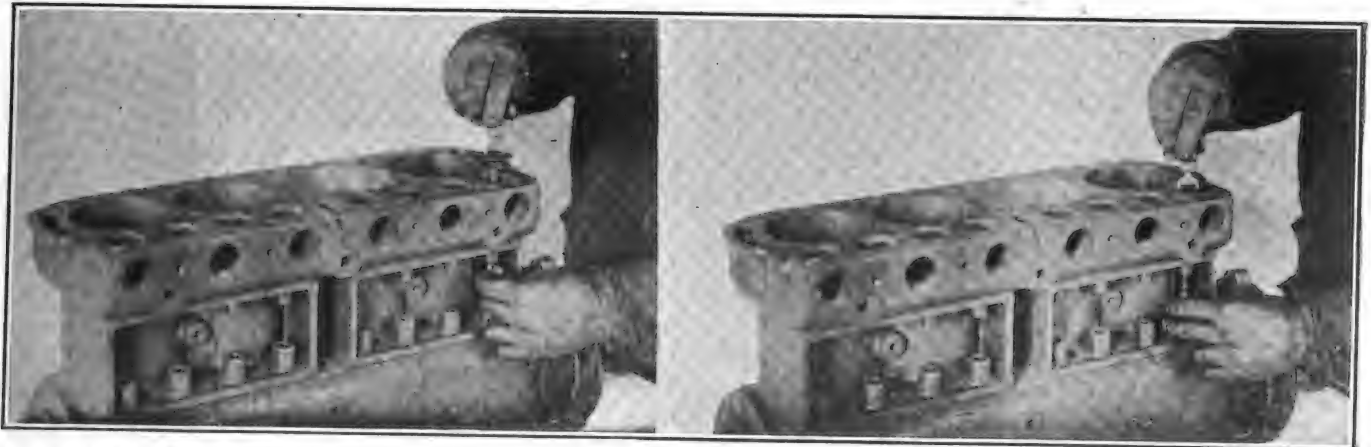
Unless the scores are deep the following method will give satisfactory results, and though it may have to be used frequently, it costs but little in comparison with a new cylinder or the grinding of the cylinder and fitting of new pistons and rings.

With the engine running at about normal speed, slowly pour two or three spoonfuls of Dixon's flake graphite into the carburetor auxiliary air intake. Between each application a short time should be given the engine to regain its normal speed. The spark plugs should then be removed and cleaned and the engine will be found to have regained much of its compression, if the scores were small, for the graphite will fill them and present a smooth surface, which will prevent the leakage past the pistons.

If the scores are deep the graphite remedy is not always effectual, and either reboring or filling of the scores will be necessary. Both of these methods are repair jobs and can only be done by persons experienced in the work. Complete dismantling of the engine is usually necessary.

For Pitted or Scored Valves.

Carbon leaves its impression on the valves in the shape of pits and scores, which may be ground out if not very deep



Two Operations in Valve Grinding, Showing How the Valve Should Be Lifted from Time to Time to Distribute the Grinding Compound.

NON-FREEZING SOLUTIONS.

Alcohol-Water—

0 degrees.....	Water	75%
	Alcohol	25%
—10 degrees.....	Water	70%
	Alcohol	30%
—20 degrees.....	Water	60%
	Alcohol	40%

Glycerine-Alcohol-Water.

—5 degrees.....	Alcohol	15%
	Glycerine	15%
	Water	70%
—15 degrees.....	Alcohol	17%
	Glycerine	17%
	Water	66%

Calcium Chloride.

34 ounces of calcium chloride to one gallon of water.

and cut out in engines where the seats are entirely destroyed.

The actual cutting operation, as well as the refacing of valves, is really a repair man's job, for it is essential that the valve stem centre up with the valve seat and valve face. There are, however, a number of machines on the market designed for special cars with which in some cases valves may be refaced and valve seats restored.

One must remember that there is a limited quantity of metal in the valve seats and that after a certain number of grindings or recuttings the cylinder block will be destroyed, so that it is essential not to remove more metal than necessary, either by grinding or cutting. Recutting is only necessary when the valves or seats are either deeply pitted or worn out of round, though after a certain number of grindings a ridge may be worn in the top of the seat, in which case recutting and installation of larger valve is necessary.

Tools and Material for Grinding.

The grinding operation requires considerable patience and unless it is carefully done it will be entirely unsatisfactory. For the work either emery or grinding compound may be obtained at practically any automobile supply house. Grinding compound is to be recommended since it comes all ready prepared.

Valves should never be interchanged with others in the same engine, and should always be kept in their own cage. For this reason each valve should be removed, ground and replaced without disturbing the others in the block, though if they are properly numbered such a precaution will be unnecessary.

A screw driver answers the purpose of a grinding tool in most cases, though there are a few valves, like the Ford, that do not have a slot in the head, but instead are fitted with two holes. For grinding these a Y shaped piece of iron or a piece of wood with two nails driven in its face may be used.

After the valve has been removed the valve chamber, as well as the entrance to the cylinder, should be stuffed full of waste or cotton cloth, so as to prevent the entrance of the valve grinding compound. A piece of string attached to the stuffing enables the operator to remove it more readily.

Details of the Operation.

Smear a small amount of grinding compound or fine emery and oil on the valve seat and drop the valve into position. With the screw driver or special tool held between the palms of the hands or the thumb and first finger, give the tool a quarter turn and back again. Do this for four times, then turn for one-half turn forward and back a quarter. This is to be continued until all the face of the valve has been ground upon all the points of the seat.

A rotary motion is not practical because of the tendency to grind scores in the valve face and seat. A valve finished in the manner directed will present a smooth and almost polished

surface to the valve seat, which is similarly finished. It will have no high places and no matter in what position it may rest it will always be tight. A perfectly ground valve will resist the carbon action longer and maintain its efficiency a greater length of time than one imperfectly ground.

Precautions to Be Taken.

Unless certain precautions are taken the valve will soon pit or score over again. To prevent this action it is essential that the valve springs are strong enough to seat the valve quickly, and that the tappets or rocker arms do not hold the valve open.

Valve or tappet adjustment varies in different engines. Where the tappets and valve stems are short the adjustment can be made closer. This is also true where the valve stems and tappets are so arranged as to be air or water cooled. Coarser adjustment is necessary in engines with long valve stems or tappets.

Because of the effect of heat on the length of the valve stems and tappets or push rods, the clearance between the tappets and valve stems should be adjusted after the engine has heated to its running temperature. This clearance should be approximately the thickness of the paper upon which this article is printed and gauges may be obtained from automobile supply houses by which it may be measured.

Attention to the Valve Bushings.

Another important part of the engine which must be in condition to get satisfactory results is found in the valve bushings. We have had many queries from our readers as to loss of power, difficulty in starting, engines that could not be throttled, etc., and in the majority of cases the trouble could be traced to air leakage by the valve stem bushings.

Most engines have been designed so that the valve stem bushings may be removed and replaced with new. If this cannot be done, however, a competent repair man can usually bore out the block and bush the holes for a small charge. The owner can never hope to obtain satisfaction from an engine that is fitted with loose valve stem bushings.

Air leakage at any point of the intake system between the carburetor and engine has an effect that varies with the position of the leak. The deleterious effect of extra air admitted near the carburetor is not as great as that admitted near the engine. For this reason every care should be taken to prevent leaks at the manifold joints. Copper asbestos, thin steam packing or paper gaskets coated with shellac may be used, depending upon the joint.

Taking Up the Cooling System.

Next to the carbureting system no part of the engine plays a more important part than the cooling system. Neither an extremely cold or an extra hot engine are efficient. So long as the cooling system contains water the temperature is kept at or below 212 degrees Fahrenheit and it delivers its maximum efficiency.

Actual practise has shown that a temperature of between 170 and 190 degrees is the most practical. Higher temperature dissipates the water very quickly, though if the water were not dissipated a higher temperature would result in more engine efficiency. If it were not for a cooling system the intense heat of the explosions would soon melt or distort the engine parts.

(Continued on Page 47.)



Removing a Valve Spring by Means of a Y Iron and Block of Wood.

Rapid Development of a Big Car Agency



Interior View on the Left: Salesroom of the H. Barcroft White Corporation, Syracuse, N. Y., Distributors of the Nash Passenger Cars and Trucks, and the Chevrolet Car in Central New York. Centre: H. Barcroft White, President of the Corporation, Who Built the First American Ambulances Used in France. Right: Show Room.

AUTOMOBILE dealers survive the storm of trade and prosper in proportion to the energies they devote to their business. A good business policy to start with and one that is strictly adhered to is another important factor in maintaining a business and keeping it progressive. Establishing a large and successful automobile agency is usually the result of years of experience, but there are many instances in the trade where men of exceptional acumen and good business knowledge have instituted prosperous dealerships in a few months time by detecting the policies of successful firms and applying them with judgment. Probably of the many notable examples of this kind none are so striking in their various respects as that of the H. Barcroft White Corporation of Syracuse, N. Y., established this spring by the man whose name it bears, and H. J. Dickman. These men were not strangers in the automobile business, having been dealers in Paris for 10 years, coming to this country when war conditions made business unprofitable in France. In a territory strange to them, however, inside of a year they have built up one of the biggest agencies in the country in Nash and Chevrolet cars.

The success of the company is not attributable in any respect to radical ideas or spectacular methods, but to a thoroughly sound business plan, which includes a well appointed sales room and service station, efficient and satisfactory service to patrons and timely and judicious advertising. Every facility is at hand for carrying on and promoting the business and the personnel of the sales, repair and service departments in the organization is of the highest type.

A most modern type of building is used by the company, situated in a very advantageous location at a corner of intersecting streets. The front part, devoted entirely to the sales department for new cars, is excellently designed for

its purpose, having a glass front on both streets and at the corner section, which is squared off, only three brick columns breaking up the view into the rooms and these support the roof structure and form the entrances. The rear section, also well lighted, is used as a used car department and repair and service station.

The appointments of the sales room are very inviting, the walls being panelled half way to the ceiling in dark finish with light panelling. A cheerful atmosphere is obtained through the liberal use of appropriate and artistic pictures, potted plants, rugs and high grade furniture. At night the whole room can be flooded with a bright illumination from electroliters suspended from the centres of the panels formed by the overhead beams, which are enclosed in concrete.

With ideal working facilities and an excellent operating organization, the company was well equipped to develop the large volume of business that has been accomplished in Nash and Chevrolet cars in the past year, but there were other factors that entered into its suc-

cess and the most important of which, and the one that special emphasis was placed upon by Mr. White was the fair treatment and attention paid customers, or the service rendered. A satisfied customer usually brings several more, and this policy bore fruit with the company. In addition to the regular Nash and Chevrolet warranties, which, of course, are backed by the makers of those companies, the H. Barcroft White Corporation formulated its own retail service policy to maintain agreeable relations with its customers and to afford them all the possible service that a dealer can render on a business basis. This retail service policy, which, of course, applies to new motor cars, is as follows:

H. Barcroft White service has been organized for the purpose of assisting our patrons to keep their motor cars in good repair and adjustment.

H. Barcroft White service includes the following:

1. We will make all necessary adjustments for one month after delivery of the motor car, providing it is brought to our service department for that purpose and has not been tampered with or



Nellie D. Prendergast in Jeffery Six, Advertising and Publicity Manager of the H. Barcroft White Corporation, Syracuse, N. Y.

injured through accident or neglect. After that time all work will be done in a careful and workmanlike manner at our regular charge for such work, except as noted in clause two.

2. We will install at our service station without expense to an owner either for parts, labor or transportation, any parts that may be replaced as defective by the motor car manufacturer or ourselves under the warranty printed below for a period of 90 days after delivery of the motor car to the purchaser.

3. All gratis work under the manufacturer's warranty is to be done at our service station and in the event an owner requests warranty work to be done a distance from our station, the expenses of the workmen for transportation, board and lodging, if any, will be charged to the customer.

4. If, at the time the warranty work is being done, we are called upon to do ordinary repair work which does not come under the warranty, the labor and material for such work will be charged at our regular rates.

5. It is understood that the inspections and instructions concerning the operation and care of motor vehicles, though made by our employees, are, in fact, made in behalf of the owner, and that the inspector or instructor is acting for him. The owner, therefore, waives all claims arising out of any fault or omission in connection therewith.

6. It is our intention to give each and every purchaser fair and business like treatment. Should any patron not receive it we ask in good faith to be so advised.

WORCESTER MAN INVENTS TURBINE GASOLINE ENGINE.

Bror Stenman, a Worcester, Mass., man, has invented an internal combustion engine, operating on gasoline, that works on the turbine principle. The engine, according to the inventor, will take up 75 per cent. less room than the type now in use of similar horsepower.

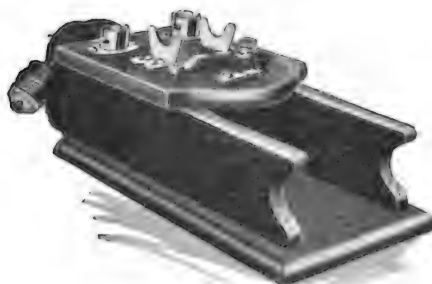
His model is eight inches long and six inches high, and he claims that an engine of that size when running would develop 10 horsepower. Mr. Stenman is not a dreamer or inventive crank, but a practical engineer and mechanic and has many valuable and prominent inventions to his credit.

EXHAUSTIVE TRACTOR TESTS IN ENGLAND.

Next August exhaustive tractor tests will be conducted in England by the officials that have in charge the promotion of agricultural development in that country. These tests, it is understood, will be conducted on an elaborate scale and will be as thorough and conclusive as the famous motor car tests that were held in that country prior to the outbreak of the war.

COMBINATION TESTER.

The Jefferson Ford unit and combination tester is a device just being placed on the market, designed to facilitate the testing of the Ford coil unit. Speed and accuracy in testing the coils makes the



Jefferson Ford Coil Unit Tester.

device handy, for in addition to the coil testing device the tester is fitted with equipment for the testing of automobile lamps, regardless of voltage or candle power, spark plugs of any type, electric horns, signals, coils, etc.

The device is made in two types, the first, No. 28, is designed for connection with the regular alternating current lighting circuit and can be furnished to connect to any commercial voltage or cycle. This voltage is reduced to 12 by the combination tester, which is the minimum voltage generated by the Ford magneto.

The second type, No. 30, is of practically the same type of construction, but designed for operation on a six-volt storage battery or four dry cells.

The top of the unit is fitted with both a single and double contact lamp socket for testing light globes; a flexible spark plug testing rack; an adjustable spark gap and a contact button. Upon the end of the device are mounted two terminals, to which may be connected leads for general circuit testing and trouble finding.

Manufactured by Jefferson Electric Manufacturing Co., 426-430 South Green St., Chicago, Ill. Price for No. 28, \$8; for No. 30, \$6.

PIRACY IN THE FIELD OF EMPLOYMENT.

The Builders' Exchange of Baltimore has issued a warning against employment piracy which may well be read and heeded by all lines of industry. It follows:

"In olden times the high seas were infested with small craft, who under the 'black flag,' emblazoned with skull and cross bones, attacked merchantmen and made booty of all that they could seize. The pirates of those days were destructive of commerce, very few profited by their ill-gotten gains.

"Another class of pirate is today abroad in the land. Pirates who in the field of employment seem only to recognize their own needs, who with apparently no consideration of the future conditions, are invading well organized of-

fices and industrial plants, making satisfied employees dissatisfied, producing an unrest and disorganization by bidding for help without investigating their qualifications, offering salaries and wages that are beyond the ability of those they seek to employ.

"This piracy is becoming so prevalent that many of the larger offices and industrial plants in all sections are today feeling its effect through the loss of employees; and the employer who has adopted this method to secure help is disturbing conditions in his own office or plant by the employment of those who are incompetent. And all of this for what?

"To avoid the necessity of careful business consideration which would introduce some well thought out plan in their own organization, whereby greater efficiency could be acquired with the present force and if necessary an advance of wages to them rather than to break into the organized forces of other offices and industrial plants; and this at a time when the loss of labor due to the demands of war has barely begun.

"The increased cost of living demands that the employee have a higher wage, still the percentage of increase offered by those who are following the method referred to is in excess of this increased cost of living.

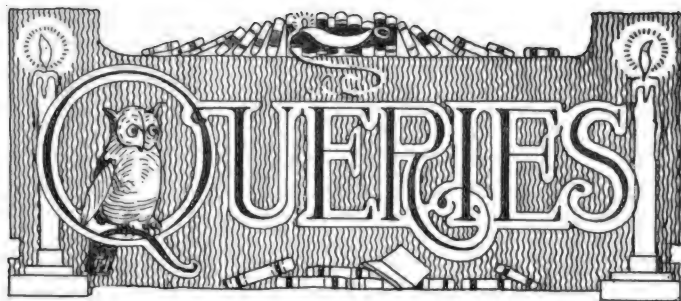
"In the last analysis the result of these conditions will necessarily be borne, either by the employer, or the consumer, which means a reduction of profit to the employer, or an increased cost in overhead charges, thereby increasing the cost of the consumer.

"The solution, it would seem, would be that the employer must organize his force so as to get the highest degree of efficiency, and probably call on each one in his employ to do a little more than their usual share, in order that he may not become a party to the methods which are now daily more prevalent. As the supply of labor has not increased, but on the contrary is and probably will be for some time to come diminishing, it is hard to conceive how any method but one of absolute cooperation and consideration of the other fellow will produce anything like lasting results.

"Man's inhumanity to man makes countless thousands mourn."

ROCHESTER SHOW WILL BE HELD IN JANUARY.

The 10th annual automobile show of the Rochester Auto Trades Association, Inc., will be held on Jan. 14-19 in Exposition Park. C. S. Simmons is managing the show. Officers of the association are: President, C. E. Sager; vice president, A. R. McKenney; secretary, Paul LeHardy; treasurer, E. M. Alling; executive committee, C. E. Sager, A. R. McKenney, Paul LeHardy, E. M. Alling, F. W. Peck, H. G. Strong, F. R. Luescher, C. T. Chapin, W. P. Knipper, G. W. Henner, G. J. Wagner, C. E. Hartson, George J. Bauer and W. E. Davidson.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT DEVICES OR METHODS DO YOU USE TO ASSURE EASY STARTING OF YOUR ENGINE IN COLD WEATHER?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of December. The contest is open to every one.

LOCATING COMPRESSION LEAKS.

(R. L. Prindle, N. Abington, Mass.)

Best Letter.

Satisfactory engine operation as to flexibility and power is directly dependent upon compression and every motorist should make a habit of testing for compression leaks.

Engines fitted with detachable heads should be given an examination where the head is fitted to the cylinder casting. The gasket at this point should be inspected and if marked with rusty, black or brown streaks, indications are that there is a leak present. A new gasket, well covered with shellac is the remedy.

Since it is known where to look for compression leaks, it is well to consider methods used in locating them. The simplest is to turn the engine over with the starting crank, comparing the compression in each cylinder with that in the others, meanwhile listening for hissing noises, indicating the escape of air.

The carbon should be removed and the valves cleaned or ground to be assured that the leakage is not through them. After this has been done the engine should be started and with it running at normal speed squirt a few drops of oil on the spark plugs at the joints, and on the valve caps, as well as around the cylinder block. If bubbles form leakage is indicated and the plugs or joints should be tightened or new parts put in place.

Before putting spark plugs into place the threads should be coated with graphite and oil. This also applies to valve covers. The valve springs should be tested for strength, and if they can be compressed or removed by hand they should be replaced by stronger ones.

For testing leaks in the intake system an oil can filled with gasoline may be used. Squirt it around the joints be-

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Avoid inefficient, weak ignition systems which cause waste; use

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PAWTUCKET, R. I.

tween the carburetor and manifold, and between the manifold and engine, also around the valve stem bushings. If the engine action is changed it is a sign of leakage, which should be remedied.

Valve guides should be replaced if leakage is evident. In replacing gaskets at intake manifold the old gaskets should be removed and the faces of both the manifold and block should be scraped clean with a chisel or sharp knife. The new gasket should be coated with shellac and the parts replaced and tightened before the shellac has had a chance to dry.

Other gaskets on the intake line should be treated in the same way. Gaskets for both purposes may be obtained from the supply house cheaper than they can be made by the repair man.

COMPRESSION LEAKS.

(C. A. DuBois, Waltham, Mass.)

Second Best Letter.

To locate compression leaks, first place lubricating oil around the spark plugs, pet cocks and valve covers and turn the engine over slowly by hand. Wherever bubbles show in the oil leaks are indicated. Engines fitted with detachable heads should be tested around the joint where the head is fitted to the block.

When leaks are located the joints should be tightened and if this does not remedy matters, new parts should be substituted, the gaskets being covered with shellac.

Next remove each spark plug consecutively and put in its place a compression gauge, which will indicate compression in cylinder when engine is turned by hand. This compression should be at least 40 pounds per square inch, and averages between 40 and 60 pounds. A compression gauge can be made by soldering a tire valve gauge into a discarded spark plug shell.

Another method of testing for compression, though not so accurate, is by comparison. Turn the engine over by hand and compare the relative amount of power needed to compress the gas in each cylinder. Weak cylinders will be easily located in this way.

Copper asbestos gaskets liberally coated with shellac may be used for the joint between the manifold and cylinder block, while paper gaskets may be used for the joint between the carburetor and manifold.

The joints should be made up while the shellac is still damp, or tacky, and after the joint has been made it should be covered with shellac. The engine should not be started until the shellac has had time to dry.

AUTO-LITE GENERATOR TROUBLE.

(R. C. M., Greenfield, O.)

I have an Overland car, model 75B, equipped with an Auto-Lite generator. This generator does not seem to give any current. Will you kindly tell me how I can test out the coils and armature?

The Auto-Lite generator is of the reverse series type, two pole, and has two outside connections marked plus and

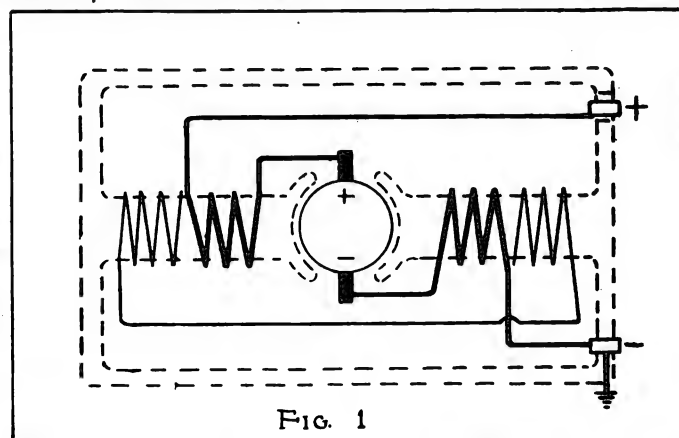


FIG. 1

Auto-Lite Generator Wiring. Taken from American Bureau of Engineering Wiring Diagrams.

HEINZE

High Tension
MAGNETO
Original in Design,
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Known
users
better



by all
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HEINZE ELECTRIC COMPANY

PAIGE

The Most Beautiful Car in America

It is a well-known fact that Paige Dealers are among the biggest money makers in the motor car field. An inspection of the Paige line will explain why.

Write for complete particulars

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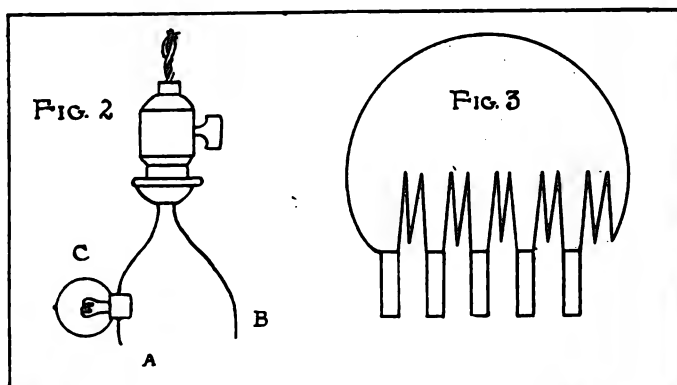
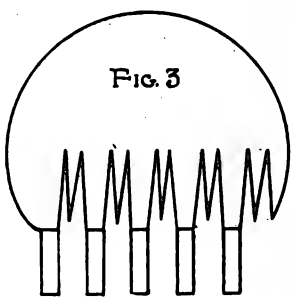


Fig. 2, Method of Connecting 110 Volt Lamp with Test Points.
Fig. 3, Armature and Commutator Connections.



minus. The minus or negative terminal is grounded, while the positive or plus terminal is connected with the cut out. (Type GG.)

Referring to the accompanying diagram you will find that the generated current passes along the following path: From the ground or negative terminal to the field winding on one pole, then to a brush, through the brush and armature to the other brush and thence through the other field winding to the positive terminal; making what is termed a series machine. To regulate the current a second winding is placed on each pole. One end of each second or reverse series coil is connected with the outside terminals, while the other ends of each coil are connected with each other.

In testing out this machine you may use either direct or alternating house current, or current from a storage battery. Assuming that you can use 110 volt house current, with a 110 volt 16 candlepower light in series with the lighting current, as shown in the second diagram, form a testing unit with the two terminals A and B. When point A is connected or touched to point B the light C will be lighted.

In making the following tests be careful not to touch the test points with the bare hands until the current has been turned off at the socket D, or an uncomfortable, though harmless, shock will be experienced.

First connect the test point B with the positive terminal of the generator, then touch the point A to the negative or grounded terminal. If the globe does not light, it is an indication that both coils (reverse series and generating) are broken. This may mean poor connection with the exterior terminals, poor brush contacts, or broken connections inside the machine. Make examination of all connections.

If the globe lights, proceed with second test. Lift both brushes (or remove them) from the commutator and make a test as above. If the light does not glow indications are that the reverse series coils are broken, either inside or at connections. Examine carefully.

Disconnect the reverse series coils from each other at X (see first sketch) and allow brushes to contact with armature commutator. Make the first test over again. If the globe lights the field coils are all right; if the globe does not light there is trouble in connections, coils or brush contacts. To trace this trouble leave test point B connected with the positive terminal and touch test point A to the positive brush (see first diagram). A lighted globe indicates coil and connections between terminal and brush to be all right. Next touch the opposite brush, lighted globe indicates proper brush connections. Next touch negative connection inside generator. Unlighted globe indicates trouble in the pole coil between the commutator and negative terminal.

If all tests to this point are satisfactory, remove the brushes and test the armature as follows: Touch a test point to each adjacent segment on the commutator and note the glow in the globe. The globe will probably light in every case, but in case of a break in one of the coils or connections the light will be dim.

In order to enable you to understand this more thoroughly, let us explain the commutator and armature construction. For each coil on the armature there is a corresponding segment in the commutator. Each coil is connected with an

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Vaporizes Gasoline



A Big Seller

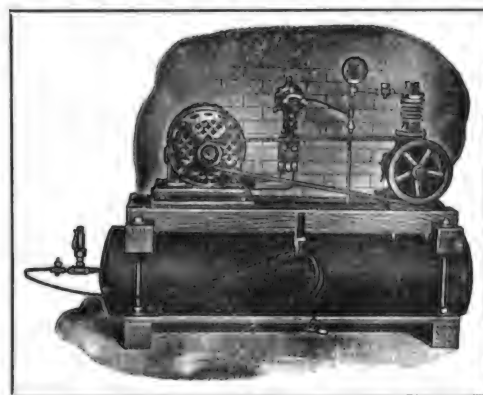
By completely vaporizing gasoline of whatever grade, the Wilmo Manifold permits carburetor to be turned down so as to give many more miles from every gallon, and practically eliminates carbon. Insures a smoother running engine at all speeds. Attached in a few minutes with an ordinary monkey-wrench. No holes to bore. Retail prices, \$7.50 (Ford size), and up. Sold on a money-back guaranty. Dealers and garage men: Write for interesting sales proposition.

The Whittier Company

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Wilmo Manifold

GARDNER LINE Free Air Unit



Free Air Unit One of the many outfits we manufacture
WE HAVE A PUMP FOR EVERY SERVICE

Economical — Efficient and Cheap

**The Gardner Governor Company
QUINCY, ILL**

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1702 Fisher Bldg. 302 Singer Bldg. 604 Arch Street

LOS ANGELES SAN FRANCISCO
Rix Compressed Air & Drill Co. Rix Compressed Air & Drill Co.
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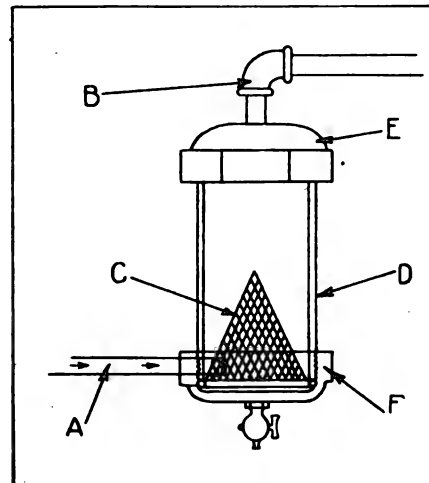
adjacent segment and to the next coil as shown in the third diagram. There are, therefore, two paths for the electric current; one through the coil, the other through the combined number of coils. If one of the coils should be disconnected or burned out, the current would pass through the other coils and the higher resistance would cause the test lamp to burn more dimly than if the coil were intact.

HIS FORD CAR STOPS.

(G. E. L., Lynn, Mass.)

I have a 1916 Ford car which has been giving me trouble for the last two months. While riding along at about 25 miles per hour the engine will suddenly cease firing, sometimes for only a few yards, but at times it will stop altogether. When cranked again it will start all right and the trouble may not reappear for days. I have cleaned the carburetor and installed a battery system, but the trouble continues. Can you give me any helpful advice?

If we read your letter correctly your engine stops very suddenly. Any trouble in the gasoline feed line would cause the engine to slow down; each explosion would become slightly less in strength than the previous one until the engine had stopped. A foreign substance lodging in the needle valve or passages leading to the needle valve might possibly give a result similar to yours. If the gasoline contains water you might get the same effect, the action being as follows: As the engine gains speed suction upon the float chamber



Gasoline Filter Made from Pipe Fittings.

gasoline draws the gasoline from the chamber, through one or two small passages into the needle valve, thence to the engine.

A very small amount of water in the float chamber would tend to settle to the bottom and the motion set up by the suction would carry a drop against the passage leading into the valve, resulting in a sudden stop of the engine. The drop of water would then fall away from the passage and the engine could be started again and would run perhaps for days before the water lock occurred again.

A drop of water in gasoline has a very peculiar property. It seems to be covered by a tough skin and may be depressed by the head of a pin. This toughness of surface, or surface tension as it is termed, prevents its passage through a small orifice, such as the passage to the needle valve, though it is flexible enough to fill the entrance and prevent the passage of gasoline.

The writer, having some trouble with his car, due to both water and sand, made up a gasoline strainer similar to the one illustrated herewith. After the carburetor had once been cleaned the filter prevented all of the dirt and most of the water from entering the carburetor. Referring to the illustration, the gasoline passes from the tank through the tube A to the inside of the fine copper gauze strainer C, which is soldered to a ring and clamped between a 1½ inch pipe nipple D and the pipe cap F. In passing through the gauze both dirt and water are retained in the chamber and the fil-

tered gasoline passes through B to the carburetor. From time to time the petcock in the bottom of the device may be opened and the sediment drained.

Though your trouble may be due to the above mentioned carburetor water, or dirt, lock, it is probable that there is some fault in the ignition line. Since you say that the trouble is not eliminated when batteries are used, it would seem that there might be a break in the coil box. Starting at the two connections or porcelain terminals where the battery and magneto wires are fastened, follow the circuit through to the inside of the box. Make a very careful examination of the switch and the connections. It is very possible that the jar of the car in running breaks the switch connection at times. The centre or switch bar is connected with a bus bar upon which rest the four coil units. Be sure that this wire is not broken and that the units are not so loose in the box as to allow them to jar away from the bar.

If the trouble is in the coil box you may be able to locate it by shaking or pounding the box while the engine is running. If the engine action is disturbed when this is done you may be sure that the trouble is located either in the box or in the connections to it.

STORAGE BATTERY CONNECTIONS.

(R. W. J., Havana, Cuba.)

Will you kindly let me know why a single cell of a lead battery will register 3.7 volts when the battery is supposed to be discharged?

Why do some cars come from the factory with batteries placed with positive poles connected with the ground. Should not the negative wire always be connected?

How is one to determine if battery is placed in car in right or wrong direction since it will crank the car whichever way it may be connected?

We have never heard of an instance where a single cell of a storage battery registered as high as 3.7 volts. The maximum reading obtained at the peak of charge is only about 2.6 volts, and this reading only continues during the time while the charging current is connected. Either you have made a reading of two cells or have a voltmeter which is out of order. We would suggest that you take a reading of the specific gravity of the electrolyte and compare it with the readings taken from the other cells. The three readings should be the same.

In a fully charged battery the electrolyte has a specific gravity of from 1.275 to 1.300. If this reading varies from that of the other cells as the discharge goes on it is an indication of a faulty cell.

Should it happen that one of the cells became damaged the reading of the battery would be materially altered, and the faulty cell would be indicated by its low voltage reading or low specific gravity.

There is no set rule for the grounding of the negative battery pole and this connection is purely a matter of design. Some systems ground the negative, others the positive pole of the battery.

Internal generator construction is the deciding factor and the essential point is that the positive battery and generator terminals, as well as the negative battery and generator terminals be connected. This connection being made, of course, through regulating devices, cut outs, etc.

If the car is fitted with an ammeter which shows charge and discharge readings the correct battery connections may be quickly determined by turning on the lights and connecting the battery to the lead wires. If the ammeter reads "discharge" the battery is properly connected. If it reads "charge" the wires should be reversed.

If the car is not fitted with an ammeter the two lead wires which normally are connected with the battery may be dipped into a solution of salt and water, about a tablespoonful of salt to a cup of water. Upon starting the engine (which should be run at a speed corresponding to a car speed of about 15 miles per hour), a great number of bubbles will rise from the negative wire, while the positive wire will have but few bubbles. The negative wire should be connected with the negative battery terminal.

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10° below in Alaska—or 100° above in Texas—it's all the same to Non-Fluid Oil. *Its consistency cannot change.*

Remember this fact, when you next need to refill your transmission and differential. Then you'll buy Non-Fluid Oil because it will work *as well in January as in August.*

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Most common greases are hang-overs from the day before motor cars. They won't lubricate until heat melts them. They leak out when melted. They contain body-giving impurities. They create friction.

Non-Fluid Oil was perfected to meet motor car conditions. It lubricates instantly. Contains no impurities; lasts longer and kills friction better than any common grease.

Give it one trial and you'll know the difference. "K-oo," Special grade is for gears; "K-ooo" grade for bearings. Sold only in orange-colored cans at your dealer's.

New York & New Jersey Lubricant Co., 165 Broadway New York.

Inter-State

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There's a big satisfaction in owning a car that is easy to get at and understand. Inter-State accessibility is a definite factor in this car's extra value. Every unit of this car is easy to get at and care for.

You will be a happier dealer if you are selling an accessible car. Write today.

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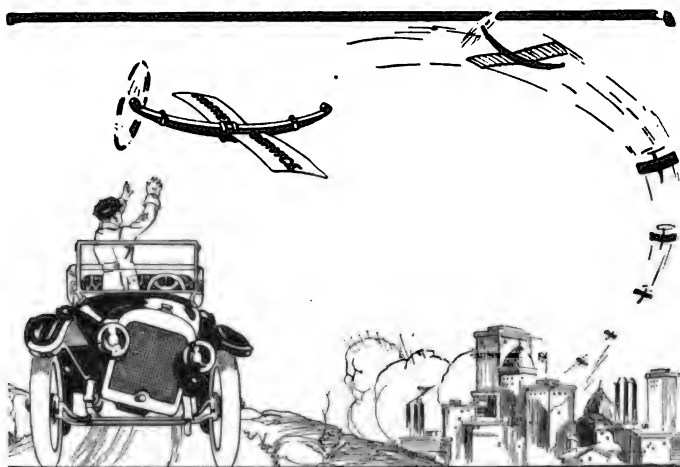
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Harvey to the Rescue

A broken spring—a frenzied customer calling for help—demanding a new spring “rush”! It’s an odd size; you have none in stock to match it!

And yet, you realize the importance of giving this customer real service, not particularly for the profit in this one job alone, nor even for the trade of this one customer, but because service at a time like this will bring the word-o’-mouth publicity which follows naturally when a customer is pleased.

So you call

Harvey
RACINE

to the rescue. There’s a Harvey Jobber near you, you get him on long distance, in a few words tell him your needs, and then turn to your customer with the satisfied feeling of work well done, because you know that already the exact spring you want and the best spring money can buy is speeding to you.

“That’s service”! says the customer. And when his car is on the road again he tells his friends about it and they say with him, “That’s service”!

That *is* Service, Harvey Service, and it’s always ready to help you build a business that will be respected far and near. They may forget the name of the spring you used but the memory of the service you have given will never be lost.

There’s A Harvey Jobber Near You

Drop us a card and we will send you his name and our Spring Book giving complete weights, styles, measurements and prices of over 900 different kinds of springs. Write today—you may need Harvey Help tomorrow.

Harvey Spring & Forging Co.
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TROUBLE WITH DELCO SYSTEM.

(J. A., Brooklyn, N. Y.)

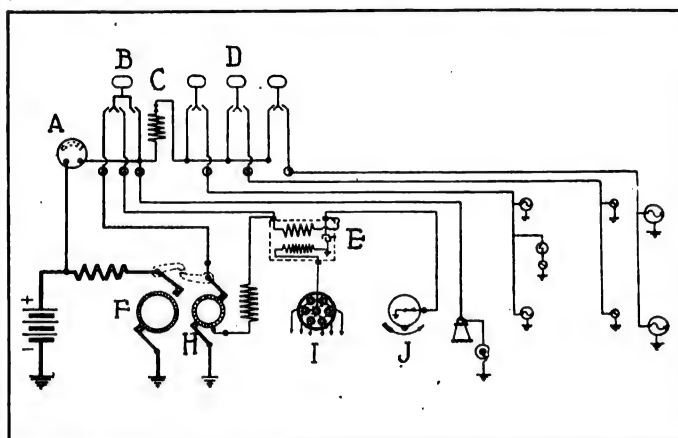
I am having some trouble with the Delco system on my Buick model E-645 car. The battery will not remain charged and I am obliged to carry it to the service station quite frequently. It seems to me that there might be a ground connection somewhere in the system because with no lights on and the engine running the ammeter indicates charge. What do you think about it?

If there is a ground or short circuit in the system it will be an easy matter for you to locate it by following the directions given herewith and referring to the accompanying wiring diagram. First make a test outfit by obtaining a light socket and placing in it one of the headlight bulbs. The two terminal wires from the socket we will term hereafter as test points.

First Test. With all switches off disconnect the positive battery wire from the battery and touch one test point to the wire and the other to the battery terminal.

If bulb glows or lights disconnect the wire from the ammeter. If bulb goes out when this is done indications are that the ground is on the other side of ammeter.

If bulb still remains lighted disconnect the heavy wire leading from the battery to the motor at the motor end. If light goes out trouble is in the motor and we would advise you to have a repair man make an examination of this unit.



Delco-Buick Wiring on Model E-645. A, Ammeter; B, Ignition Switch; C, Cut-Out; D, Lighting Switches; E, Ignition Coil; F, Motor; H, Generator; I, Distributor; J, Breaker Box.

If light still remains lighted it is an indication of a ground between either the battery and ammeter or between the battery and motor.

If light glows in first test and indicates trouble on the other side of ammeter, the grounded circuit is probably in the horn wire. To be sure of this disconnect it at the switch (3) and watch light bulb, if the light goes out, supposition is correct, otherwise make careful examination of switch connections and be sure that all connections are made as in diagram. Be sure that all lint, dirt, dust, etc., is removed from switch terminals.

Second Test. If light does not burn in first test proceed as follows: Try each lighting switch in succession, in every case bulb will glow, but if it burns at full candle power, ground connection is in lighting circuit controlled by that switch which causes bulb to burn full candle power.

Third Test. If trouble is not located in any of the previous tests, with lamp connected as in first test and all lights off, pull out switch B (ignition), light will probably burn. Disconnect wire No. 2 at generator and wire No. 4 at ignition coil. If light continues to burn ground is in one of these wires. Disconnect each in turn at the switch to locate trouble.

Restore all connections and remove test lamp. Pull out ignition switch and note whether generator motor shaft revolves, if it does not the unit is at fault and a repair man should be consulted. If it does revolve the starter works

properly, and the ignition unit functions the battery charging trouble is due to low charging current. If this is the case we would advise you to consult a repair man familiar with generator troubles.

MAXWELL AND FORD QUERIES.

(G. W., Cohasset, Mass.)

My Maxwell model 1, 1911, will not run over five minutes and when it stops I can hardly turn the engine over by hand. In fact, it is difficult to crank it at any time unless the pet cocks are opened. Can you tell me a possible reason for this?

Would it be practical to take current for lighting tail and head lights from the magneto of my Ford car, year 1913?

(The Maxwell car spoken of is probably a Maxwell-Briscoe.—Ed.)

It is evident that there is considerable internal friction in your Maxwell engine, probably in one or more of the cylinders, due to oversize pistons or rings. That the friction increases with the heat shows the trouble to be in the pistons rather than the bearings. We would suggest that you remove each of the pistons and measure them.

The clearance at the top of the piston should be .004 and the clearance at the bottom should be .0025. By the clearance is meant the difference between the piston diameter and cylinder diameter. Since the lowest part or skirt of the piston is not subject to as much heat as the upper part, the clearance need not be as great.

Be sure that the cylinders are not worn out of round or egg shaped. We have heard of cases where new pistons were fitted to cylinders out of round, the measurements being taken on the longest diameter so that when the piston was in place the fit was too close.

A careful examination should be made of the rings. Be sure that the rings do not bind in the piston grooves and that a slight clearance is left between the ends of the rings when they are in place. This distance should be about .008 on the lower ring and .015 on the upper. If this space is not left the ring will bind and cause trouble as soon as it is heated.

We doubt if you will be able to get satisfactory results from your Ford magneto if you use it for lighting. This magneto was somewhat smaller than the one in use on the 1917 cars and was designed for ignition only. When used for both ignition and lighting it is put to a severe strain and depreciates very rapidly.

We would suggest that you use a storage battery or acetylene tank for lighting and keep all of the magneto current for ignition.

MARMON PRICES WILL BE ADVANCED ON DEC. 1.

The Nordyke & Marmon Co., Indianapolis, Ind., makers of the Marmon car, have announced an increase in price, which will become effective on Dec. 1. The Marmon sedan after that date will sell at \$5000, the landaulet at \$4650, limousine at \$4550 and the open cars at \$3550.

PRICE OF COLE CARS TO BE ADVANCED ON JAN. 1.

The Cole Motor Car Co., Indianapolis, Ind., has announced that two new sport models will be brought out early in the new year, a four-passenger and seven-passenger type. Prices of all Cole models will be advanced \$200 on the first of the year.

GENERAL ENGINE REPAIRS.

(Continued from Page 38.)

There are many things which effect the cooling system which must be kept, as above stated, between 170 and 190 degrees. Deposits of alkaline substance, scale or dirt retard the circulation, retain heat and upset the system generally.

Cleaning In General Overhaul.

In making a general overhaul of the engine the cooling system should be given an application of cleaning compound, such as potash, lye or washing soda, or both. A strong solution is mixed and after being carefully strained through cloth

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put into the cooling system. The engine should then be started and run until the liquid is thoroughly warmed.

While it is still warm it should be drained and a stream of water turned into the filler cap from a hose. This clean water should be allowed to flow through the system with the engine running until all traces of rust or other discoloration have disappeared.

Elsewhere in this story is given a table of anti-freezing solutions to be used in the cooling system. Where solutions of this sort are used they should not be used in greater proportions of chemical to water than given, or the boiling temperature will be lowered and dissipation will be rapid. This is particularly so of the alcohol solution, which must be replenished very frequently.

The observant motorist has probably noticed that though his mileage per gallon of fuel is satisfactory in the summer months, considerable of a drop is noticeable in the winter. This is usually due to the condensation of the fuel in the manifold and the fact that the engine temperature is reduced.

Manifestly a cooling system cannot be devised that will be applicable in itself to changes in temperature from 90 degrees to below zero without the use of thermostatic controls of various types. A few of the cars now on the market are fitted with automatic radiator covers which are thermostatically operated and are designed to expose just enough radiating surface to the air to maintain the maximum temperature of 170-190 degrees. The owner of a car not so equipped will find the efficiency increased if he covers a part of the radiator with cloth or board. Care must be observed not to decrease the radiating surface to such an extent as to cause the water to boil in the system.

Repairs to Pistons, Rings and Cylinders.

We have spoken of the oiling system and its importance in the functioning of the engine and shown some of the results of carbon deposits, both subjects being related. Both lack of lubricant and excess carbonization have their effects on cylinders and pistons, not only in the scoring (which has been taken up) but in the wear of pistons, rings and cylinders.

Before a repair can be made upon pistons or rings, the cylinders must be restored. Careful measurements should be made of the cylinder diameters, the diameters at the upper, lower and middle of each cylinder should be compared. More than one measurement at each position should be taken in order to locate any possible "out of roundness" that might be present.

With the cylinders perfectly round and unscored the rings may be fitted in much the same way that a bearing is. Care and patience are necessary in this work.

The first step in fitting a piston ring is the rough cutting of the length. The ring should be slipped into the cylinder and the ends butted together so that the edges are smooth. Only enough metal should be taken from the ends to permit this and no gap should be left.

Preparation of Wood Form.

A wood form should first be made just large enough to fit the cylinder smoothly and fitted with a clamping device at the top to hold one ring. The interior of the cylinder should then be coated with Prussian blue and the ring, mounted on the wood form, slipped into the cylinder and drawn back and forth. When removed the high or contacting places on the ring will be indicated by the blue.

These high places should be carefully scraped off with emery cloth or a fine file and the ring again put into the cylinder. This operation should be continued over and over until a perfect contact is indicated. It should then be fitted to the piston groove.

The piston groove should be scraped free from dirt and carbon and the ring rolled around in it. If the ring does not fit the groove it may be dressed down by means of an emery cloth mounted on a flat board. With the ring fitted to the groove it may be put into place on the piston.

Each ring should be fitted carefully in the manner outlined above and to the cylinder in which it is to run. When fitted and before placing on the piston the ends should be cut so as to allow a slight clearance between them to make up for the expansion caused by heat.



PIERCE-ARROW

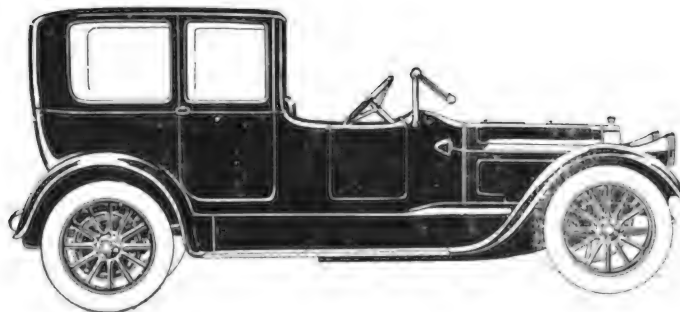
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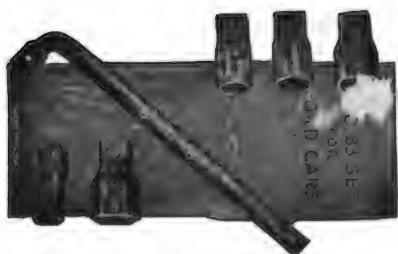
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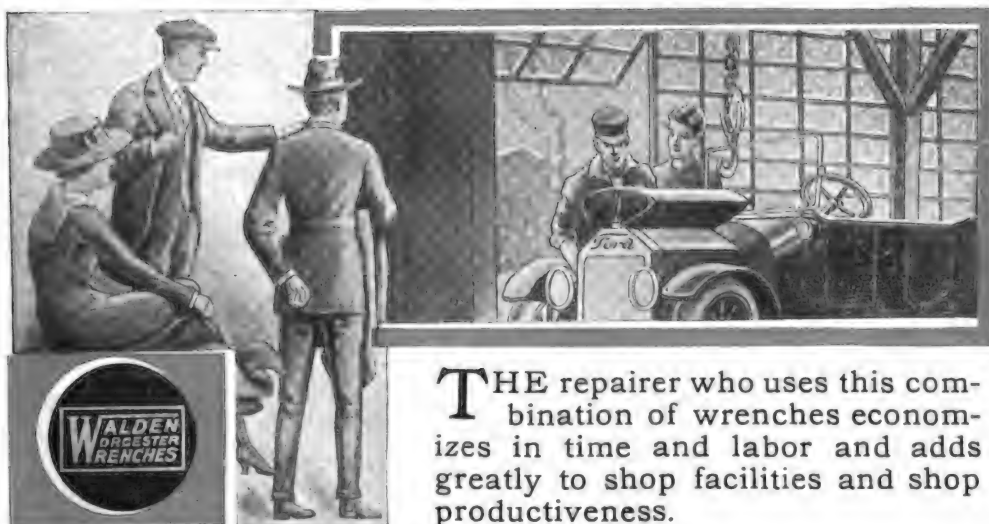
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VOL. LXIV.

DECEMBER 10, 1917.

NO. 9.

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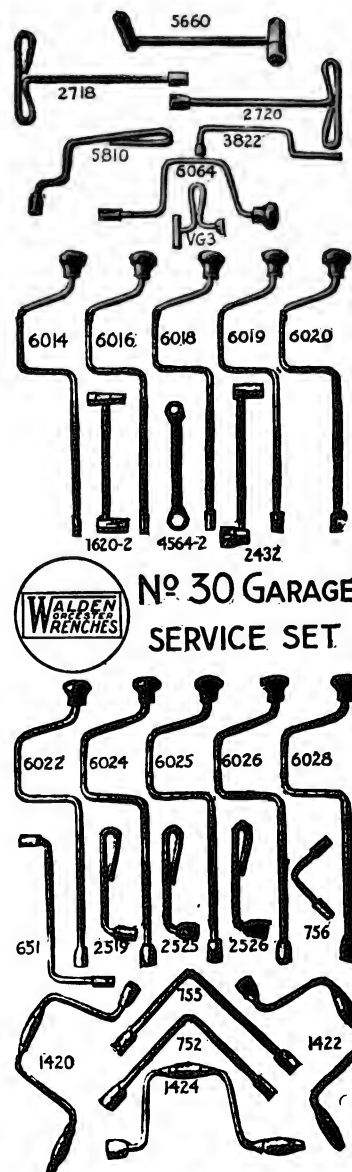
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1917 SALES

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From National Automobile Chamber of Commerce,
7 East 42nd Street, New York, August 27, 1917

Embargoes Affect Motor Car Exports

Thirty-five Per Cent. Decrease in Shipments to Great Britain, France and Russia During Last Fiscal Year—Big Increases to All Other Countries—Shipments Total 80,811 Cars, Valued at \$90,958,243—Thirty-three Hundred More Vehicles Exported, But Aggregate Value is \$6,507,000 Less—Fewer Trucks and More Passenger Cars.

Figures just issued by the Department of Commerce show that during the 12 months ended June 30, 1917, the United States exported 80,811 automobiles and motor trucks, valued at \$90,958,243, as compared with 77,499 cars, valued at \$97,465,811 during the preceding fiscal year.

Analyzing the official figures, the National Automobile Chamber of Commerce finds that the increase in number of cars exported is due to the larger shipments to most countries outside of Europe, which more than offset the decreases in exports to Great Britain, France and Russia, due to import prohibitions and lack of shipping facilities.

The fact that the aggregate value of exports during the last fiscal year was less by \$6,507,000 than in the preceding year, while the actual number of vehicles exported was greater by 3312, is due to decreased shipments of trucks for war purposes, the average value of which is much higher than the average value of passenger cars exported to countries outside of Europe.

Exports of commercial vehicles and passenger cars during the two years were as follows:

	1916		1917	
	No.	Value	No.	Value
Commercial....	21,265	\$56,805,548	15,977	\$42,337,315
Passenger.....	56,234	40,660,263	64,834	48,620,928

Thus, while the number of trucks exported fell off 5288 in the year and their aggregate value was \$14,468,233 less, the shipments of passenger cars increased by 8600 and their value by \$7,960,665.

Great Britain and France were still our largest markets, despite their heavy falling off in purchases. The former bought \$18,508,442 worth last year, mostly trucks, as against \$26,147,232 worth in the previous fiscal year. France's imports were nearly all trucks and amounted to \$14,691,460, as compared with \$19,137,904 in the 12 months ended June 30, 1916.

Owing to shipping difficulties and internal political

troubles, Russia's imports fell from a value of \$15,686,874 in 1916 to \$6,371,982 in the last fiscal year.

Exports to the rest of Europe combined increased remarkably, when it is remembered that no shipments went to the central empires. The increase amounted to more than \$1,000,000 in the year, accounted for largely by exports to the Scandinavian countries, Holland and Spain. Europe as a whole took slightly less than one-third by valuation of the total American exports.

Aside from the European countries, Canada is America's best customer for motor cars, having increased her purchases by nearly \$4,200,000—from \$7,280,151 in 1916 to \$12,088,787 in 1917.

Next comes Asia and Oceania, with imports of 9716 cars, valued at \$10,093,720 last year—an increase of \$1,450,927. Australia follows, with 5000, valued at \$4,213,874. The British East Indies increased their purchases from \$2,307,739 to \$3,617,351.

In the Americas, after Canada, the West Indies were our best market for automobiles, to the extent of \$4,072,647—an increase of \$1,248,735 over the year before.

The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

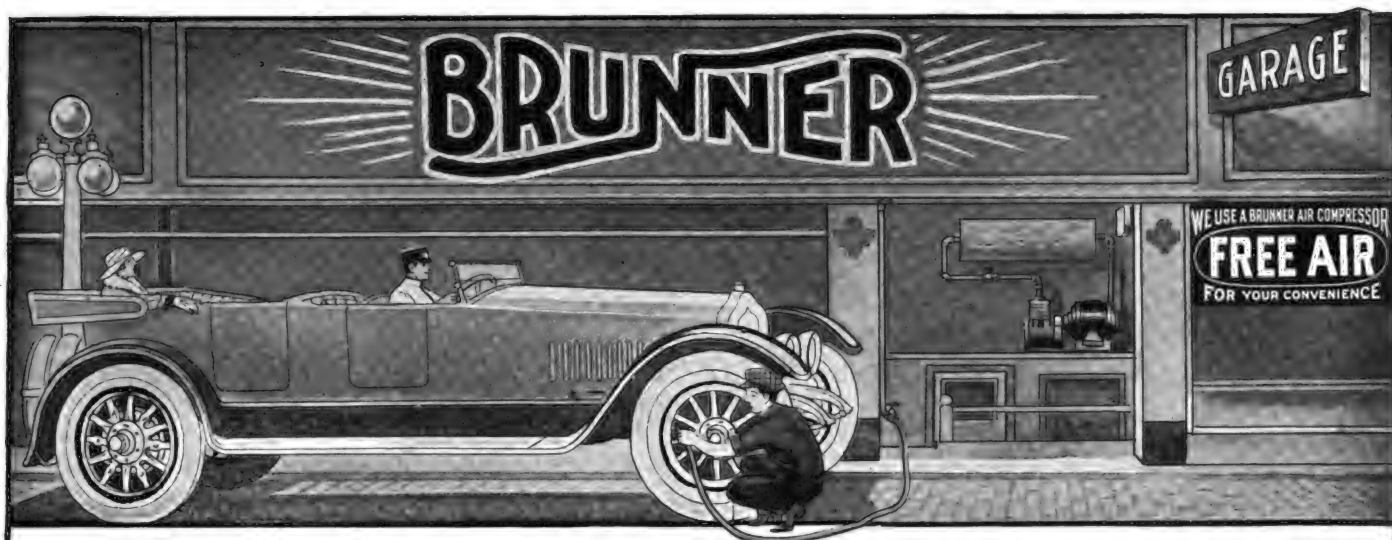
In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workmen.

If you are a member of the Foreign Trade Bureau conducted by the Automobile Journal Publishing Company you can reach 8,000 foreign buyers of pleasure cars, trucks, parts, supplies, accessories, tools and equipment in more than 81 foreign countries.

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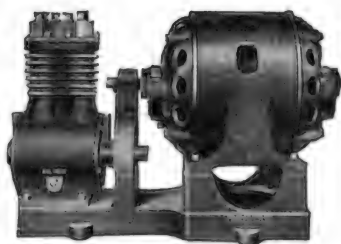
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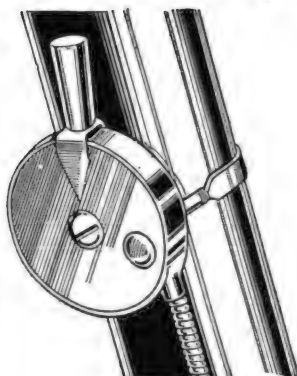
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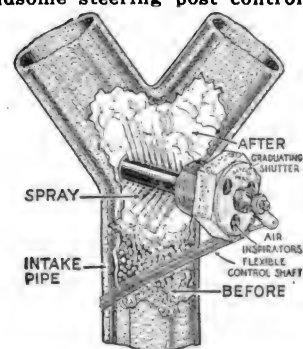
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SHOW ISSUES

SHOW AND SPECIAL ISSUES

Application for Membership in Audit Bureau of Circulations



*National Authority on Highway
Haulage*

December, 1917

Annual Dealers' Number

January, 1918

Specification Number

February, 1918

Boston Show Number

Application for Membership in Audit Bureau of Circulations



ALL TRADE SHOW EDITIONS

December 25, 1917

Advance New York Show Number

January 20, 1918

Advance Chicago Show Number

February 25, 1918

Advance Boston Show Number

March 25, 1918

Trade Buyers Number

4 GREAT NUMBERS 4

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Entered as second class matter, April 15, 1906, at the Postoffice at Pawtucket, R. I., under act of Congress of March 3, 1879

Ten Cents
a Copy

IN THE annual New York Show Advance Number of the Automobile Journal, which will be the next issue of this magazine, will be presented for the first time in any publication complete specification data of cars that will be built in 1918. It will anticipate all the features of the big national exhibition which is to be held in the Palace Garden, Jan. 5 to 12, and present a foreview of 1918 production with a fullness of subject and detail fitting the widespread demand for lucid, accurate information on cars of 1918. All of these features will be copiously illustrated.

A SPECIAL feature of the Show Number will be the constructional details of a high grade car. The mechanical staff has been at pains to make this special description a towering feature in the serial which has been running for six months. With many selected illustrations this feature in itself will be an outstanding, practical contribution to periodical literature on the used car which no publication in the land can match. Features of body design, details of new cars and strong mechanical discussions will round out and make complete this remarkable periodical. All will be handsomely illustrated with half tones and special drawings.

WHAT a romance there is in the mechanical development of all vehicles since the gasoline car began its career. The motor car and its offspring, its brothers, sisters and cousins, and all the mechanical kin of the internal combustion engine are to be featured popularly. Show fashions and motoring costumes of the very latest mode are shown in the fashion feature section, which will contain valuable hints for all motoring occasions and a surprise for the dressiest.

VOL. LXIV.

DEC. 10, 1917.

NO. 9.

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Treasurer . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

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A FACT not to be overlooked is that the current journal is most meritorious in content, context and illustration. Besides a story on lighting of supreme importance to every driver and rider, the fuel subject and the protection of cars against theft are exhaustively treated. In the news sections of the National Automobile Association important new traffic laws and legal decisions are fully noted and clearly explained. The mechanical construction of the Packard is presented in this issue by the mechanical staff of the Automobile Journal for the benefit of the practical mechanic and owner to whom the overhaul of this great car is a matter of prime importance. The article is one of the series on the overhauling of used cars and is a notable addition to its popular and illuminating predecessors.

CONSTRUCTIONAL features of the 1918 passenger cars will be given special emphasis in the show number and issues following. Careful and accurate text is supplemented throughout by a wealth of illustrations from photographs and diagrammatic sketches which will make the issue by far the most elaborate and distinctive of its class. Description of seasonable and all-year round bodies, lighting and starting systems, accessories, parts, fittings and supplies, invaluable to car owners, dealers in new and used cars and repairers, make up scores of freely and selectively illustrated pages. While the magazine will be on sale at the show it is best to order advance copies early. At no previous time has there been such a wealth of material and motoring information offered to the public in any publication specializing in passenger cars and the interests of their owners and distributors. Don't miss getting the New York advance show number.

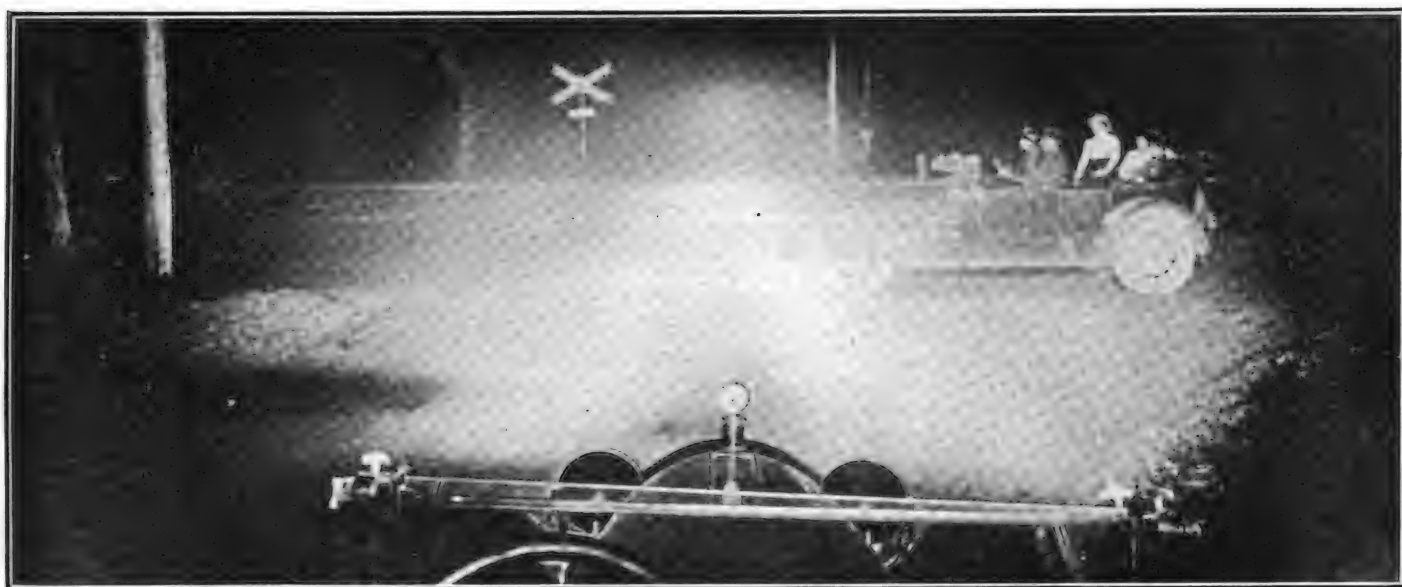
THE Automobile Journal

LXIV.

DECEMBER 10, 1917.

NO. 9.

How and Why to Eliminate Glaring Headlights



Nature's Dimmer, a Heavy Fog, Teaches Road Lighting in This Remarkable Night Scene Photographed Near Indianapolis.

AN ARTICLE published in the Automobile Journal of Oct. 10, dealing with information on the legal phases of the headlight question, gave the headlight requirements of all the states and called the motorist's attention to the fact that as long as his car was equipped with glaring headlights he was breaking the law. In that analysis of the headlighting problems of 1917 the main conclusion was stated thus: After examining the various laws of the states which have so far legislated upon the subject, it seems apparent that the motorist can comply with the intent of the law in practically every state by observing the extreme provisions, which would include the use of headlights that are so constructed, treated or equipped to prevent the beam of light rising more than 42 inches above the road at a point 75 feet ahead of the car, yet not so dimming the light but what it will be sufficient to make the roadway clearly visible 500 feet ahead and to provide a sufficient illumination to reveal objects clearly at a distance of 250 feet ahead of the car and 10 feet to each side of the road at a point 10 feet ahead of the car; headlights should not exceed 21 candle power each and spot lights of over four candle power should be equipped with some dimming device or means of deflecting the rays.

It was pointed out also that only proper equipment of a headlight eliminated the motorist as a violator, added to his driving pleasure and showed a

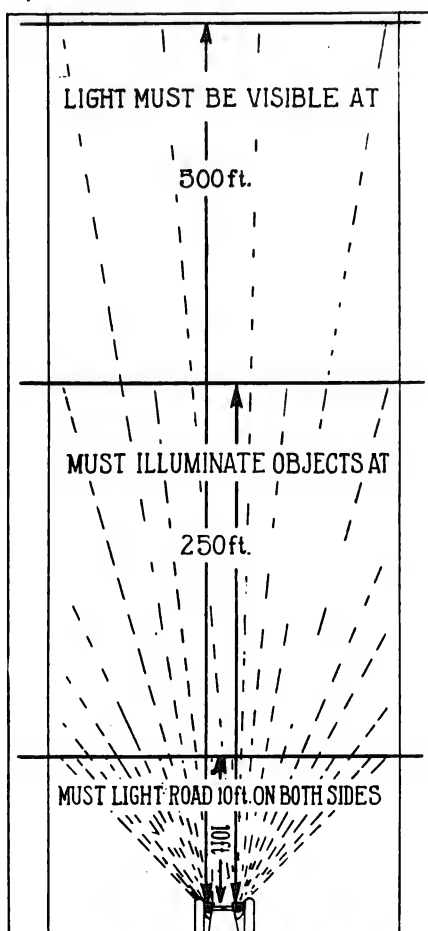


Diagram of Light Projections.

willingness to be courteous to other road users.

There is another phase of the headlight problem which is the basis of the laws framed for the protection of traveling motorists, that of safety. And in motorizing an increase of the factor of safety is doubly important because of its public and private character.

Examining the Safety Factor.

The motorist who drives a car fitted with blinding headlights is a menace to traffic and a breaker of all laws of safety, as well as those of government. Not only is he a menace to other drivers, but he is all the time taking a chance with his own safety and the safety of the passengers in his car. It is, therefore, the duty of every law abiding citizen to see that the headlight laws are enforced, and that no automobile is allowed to be operated on the highways without some means of eliminating the dangerous filament glare common to electric globes.

Not such a very long time ago the automobile was a curiosity and one might travel for days at a time through the country without encountering or passing one on the road. The roads were in some cases poor and the motorist was forced to provide his car with strong lights to protect himself when he intended to drive at night.

In those days glaring headlights were not criminal nor did they constitute a hazard to other motorists because traffic was not heavy, nor could the motorist travel at such high speeds as at

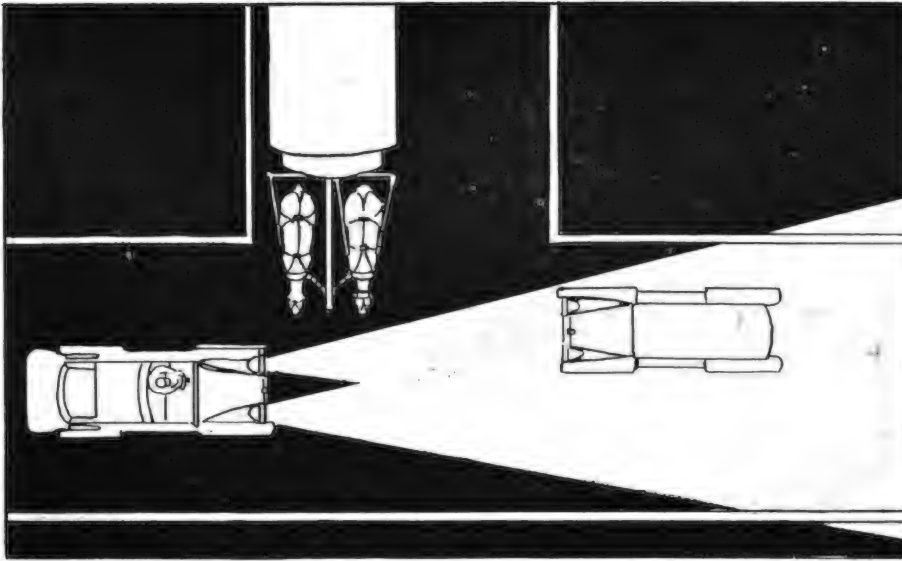


Diagram 1. Blinded by the Lights on the Approaching Machine, the Driver Cannot See the Horses Entering from the Side Street.

present his car is geared to produce.

Strong Headlights Less Essential.

With the advent of good roads, fast cars and heavy traffic conditions have changed and what was permissible three or four years ago today is considered a menace. There would be a good excuse for intense illumination and glaring lights if the road conditions were poor, but since the advent of the motor car all parts of the United States roads have been vastly improved where most of the night driving occurs, viz.: in or near cities.

The traveling public would never allow an automobile to be operated on the highways if the machine were fitted with mudguards extending three feet on each side of the car, yet a pair of glaring headlights, in effect, are just as great a menace.

The driver of a car approaching a high candle power light is temporarily blinded and his sense of proportion is altered. There is a certain nervous reaction that would tend to cause the driver to turn his car toward the source of light and thus cause a collision. There are many cases on record where two cars have come together in the evening with apparently no cause. Both drivers are put in the same peril, for the driver whose car is fitted with glaring lights does not know of the effect upon the approaching driver until it is too late to swing to the right. In many cases such a procedure would be impossible because of the narrowness of the road or the proximity of ditches or walls.

Lighting Makes Its Own Perils.

Another peril which confronts the driver of a car equipped with glaring lights is the danger to his car through collision in turning corners. Accustomed as he is to intense illumination, he may turn a corner and run directly into a stationary machine or team, for in turning he is momentarily deprived of the use of his lights and poorly illumined objects are not seen at all.

It, therefore, is distinctly to the ad-

vantage of the motorist himself to fit his car with non-glare or indirect illuminating devices, as much for his own safety as for compliance with the law.

If every motorist made an effort to secure ideal illumination for his own car he would be obliged to equip his machine with higher candle power lights than any other car on the road that he might meet. This would mean that sooner or later every car would be equipped with two miniature suns, the light from which would effect drivers with a temporary blindness to poorly illuminated objects for quite a few minutes.

Everyone will admit the selfishness of the procedure as well as the impossible traffic conditions that would soon arise if this lighting method were to be adopted. Accidents would multiply and it would soon be unsafe to travel on the roads at night.

Happily there are laws in the land which prevent such an abuse of the roads and motorists' rights, but, nevertheless, the nuisance still continues to a

degree. When one considers the number of cheap appliances and devices that may be used for eliminating the glare of headlights, there is no excuse for the abuse of the road or the breaking of the laws.

Risks Taken on the Highway.

Every operator will admit that there is untold inconvenience experienced in the approach of a blinding glare. If he is not familiar with the highway over which he is proceeding he runs the risk of a collision with a pole or the ditching of his car.

While within the field of illumination he is unable to distinguish any objects on either side of the approaching machine and so, unless he stops his car, he practically takes his life in his hands if he proceeds. It may be that the approaching car is in the act of passing a team or pedestrian, and the blinded operator in this case will be the guilty cause of a serious accident, even though he is to all intents and purposes innocent.

By not enforcing the law a premium is put on the breaking of the laws because of the fact that in order to protect ones self the motorist is forced to keep his lights at their maximum efficiency. This generally accepted attitude of trying for light supremacy leads to the feeling that the laws are too exacting. Such an attitude is reprehensible and has been responsible for hundreds of accidents in which the participants were those who believed regulations to be right for other people, but unnecessary in their case, consequently ignoring them until the inevitable consequences overtook them.

It is the same situation that developed with the speed limitation laws which have been in force for years, yet a magistrate who in New York city handles thousands of cases annually, finds that only the severest penalties serve to keep the same offenders from constantly reappearing in court.

Taking the Big Chance.

No one doubts the intelligence of the offenders or that they do not realize the danger incident to their carelessness, but

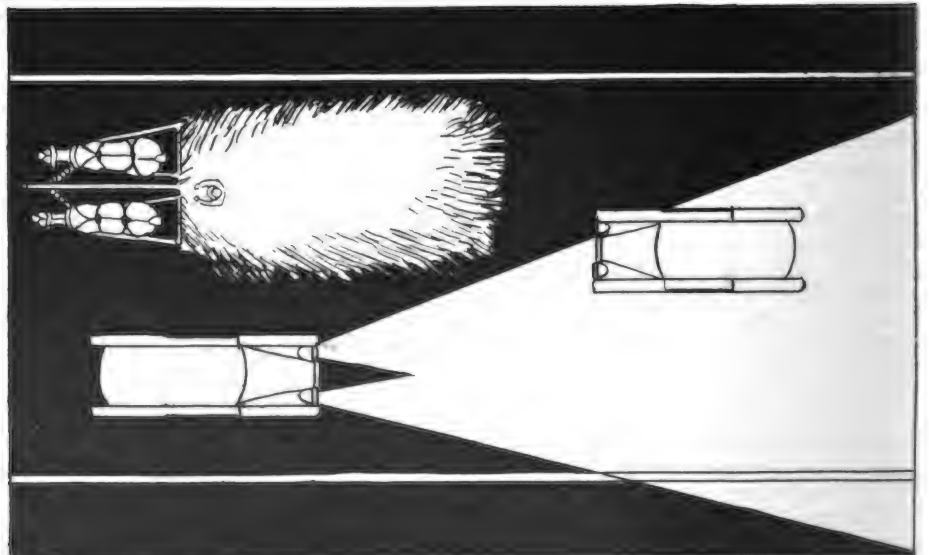


Diagram 2. When the Road on Both Sides of the Glaring Headlights Are in Darkness There Is Danger of Collision with a Slow Moving Vehicle Ahead.

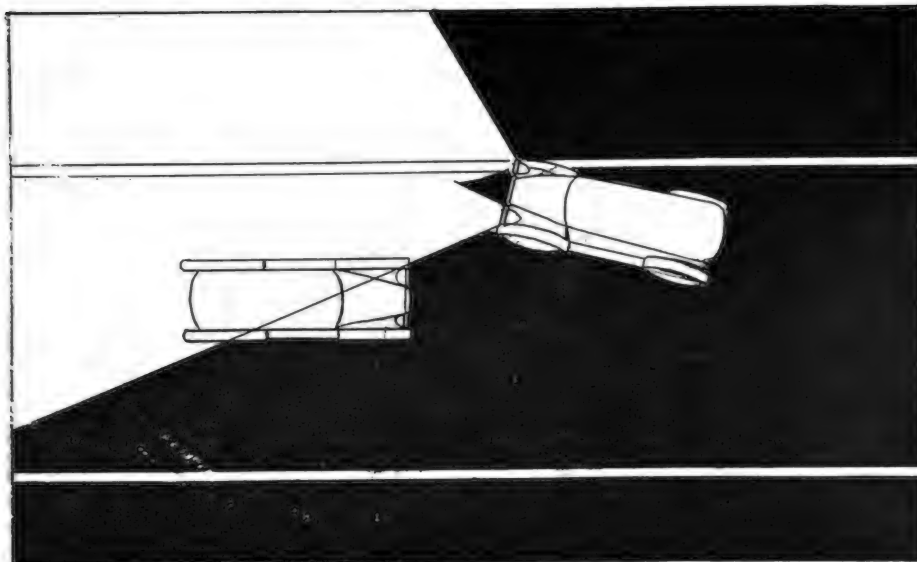


Diagram 3. A Driver Blinded by Glaring Lights Instinctively Crowds Toward the Light, Forcing the Oncoming Machine In to the Ditch.

there is no explanation for the constant transgressions of the laws except that they are willing to "take the chance" themselves, regardless of the consequences and danger to others.

Perhaps it is because of the fact that many motorists are willing to pay possible fines and still retain their glaring lights that there are so many of these nuisances still in use; perhaps, again, it is because the owner of the brilliant lights is not so liable to accident, as are the other travelers; at any rate it is all a question of selfishness and disregard for the safety of others.

In most instances it is a matter of a few hours, possibly the outlay of a little cash, or because the motorist can secure cheap insurance against accident for himself as well as others. There are many devices on the market, as well as lenses, that are both ornamental and useful, which are procurable for but little money.

Devices to Remedy the Evil.

Headlight devices may be divided into four classes, special lenses, bulb attachments, shades and tilting devices. The first are usually in the form of prismatic surfaces which tend to reflect the direct rays of light without absorbing them, and directing them downward to the road or toward the side. The second class are bulb attachments, some of which deflect the light, others reflect it and still a third type absorb the direct rays. The third class may be attached either to the reflectors or the lamps themselves and are designed to tip the lights forward and so cut off all illumination above a certain height.

In an article of this length it will be impossible to give a description of every device on the market, so only a few of each type are described.

The Corning Glass Works, represented by Edward A. Cassidy Co., Inc., of Madison avenue, New York, manufacture a headlight lens which may be obtained in sizes from 3 to 11½ inches in diameter in both plain and No-viol glass—the so-called Noviol glass be-

ing a yellow. This lens is in one piece but cast with ribs parallel with the ground line, broken at the centre by vertical lines, giving a checkerboard effect of triangular formation. By means of the longitudinal prisms the light is deflected downward, while the centre formation distributes the light to the sides. The makers claim that though the light is concentrated at the front of the car there is an absence of glare.

The Legalite Lens, made by the Legalite Corporation, Boston, Mass., is curved and cast with longitudinal ribs to deflect the light downward and prevent direct rays from extending above a line parallel with the road. The curved feature deflects the light to the sides.

In the Osgood the longitudinal prisms are of varying width, the lower prisms are designed to illuminate the road far ahead of the machine, while those at the top are at a sharper angle and refract the light to the road nearby. Side illumination is obtained by refracting the light at the centre of the lens by a rib at

the centre; this device is sold by the Osgood Lens and Supply Co., Chicago.

A device called the Prismolite, made by the Prismolite Co., Fourth and Gay streets, Columbus, O., is a checkered surface glass with small ¼-inch prisms covering the entire surface. This glass produces two sheets of light, neither of which has any of the direct glare rays.

The Saferlite Lens Co. of New York manufacture a lens of the same name, which consists of finely cut prisms averaging 30 to the inch, distributed over the face of the lens. The direct rays are refracted over the entire surface and give a bright glow on the road ahead. With this device direct bulb illumination and glare are eliminated.

An ornate device known as the More-Lite Lens, is manufactured by the L. E. Smith Glass Co. of Mount Pleasant, Pa. This device is made in either white or amber glass for any type of headlight and consists of a number of concentric prisms, cut by radii and fitted in the centre by triangular prisms, for diffusing the direct glare.

The Warner Lens, made by the Warner Lenz Co., Chicago, Ill., is an extremely attractive lens, consisting of round projections arranged in a fan like arrangement around the centre of the glass. Twelve of the large car manufacturers have adopted this lens as standard equipment. Though the light transmitted through this lens is brilliant and possesses high illuminating power, it does not glare in the eyes of the approaching driver.

A distinctive lens, known as the Star, is manufactured by the Lancaster Lens Co. of Lancaster, O. This is a glass front upon which is sandblasted a many pointed star, the points of which are near the outer circumference. Only the extreme points of the star are left clear, so that practically all of the direct glare is diffused through the snowy finish of the glass.

Second Type of Devices.

The second type of head lamp devices are designed to be attached to the bulb

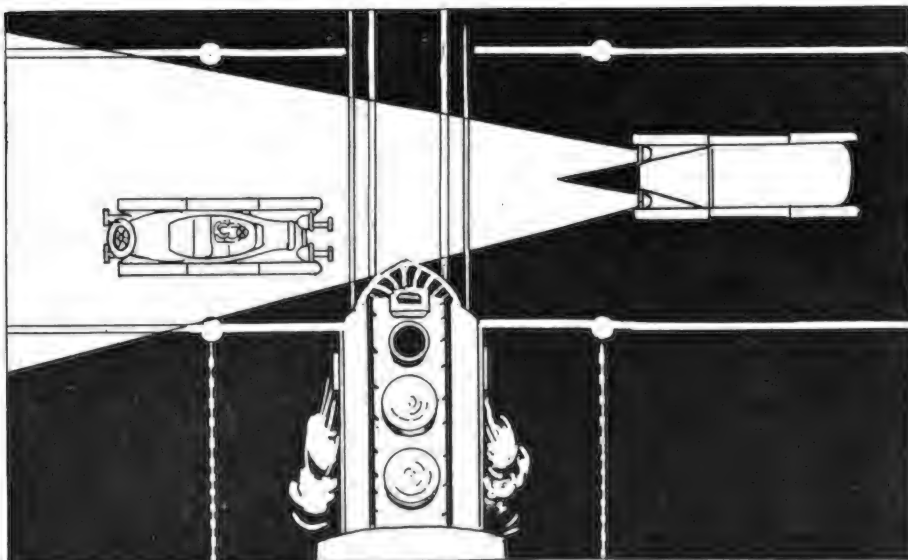


Diagram 4. At an Ungated Railway Crossing the Blinded Driver Is Unable to See the Dim Lights of the Approaching Locomotive.

and either absorb or refract the light rays. The Fracto lens, made by the Crew-Levick Co. of Philadelphia, Pa., is of this type and consists of a heavy glass half cone, which is attached to the lower part of the globe. By means of ribs the light rays are refracted and cover a fan shaped area in the road ahead.

J. H. Faw, Inc., 41 Warren street, New York, market a device called the Lennon light protector. This device is made of one piece of polished nickel plated spring brass and fits on the under side of the light bulb. By reflecting the light to the upper part of the parabolic reflector all direct beams are thrown down upon the road.

The Perrin Manufacturing Co. of Detroit, Mich., sell an aluminum device which clamps on the under side of the bulb and prevents direct rays from being projected upward.

A well known device for cutting off and controlling the upward light rays is known as the Lawco deflector, made by the F. H. Lawson Co. of Cincinnati, O. This device consists of a visor like arrangement placed in front of the headlight and interrupts all but longitudinal light beams.

The Glare-Off, made by the Glare-Off Co., Broadway, New York, is a device which may be attached to the regular lens and is designed to cut off certain light rays, both at the centre, where the bulb is located, and at the upper outside edges of the lens.

Representations of Another Type.

A device of the fourth type is represented by the Pennock headlight tilter. When this device, which is made by the Specialty Manufacturing Co., Minerva, O., is in use, both headlights may be tilted by the pressure of the foot upon a pedal located in the car, thus cutting off all but the necessary light upon the road.

The A-B auto eyes, made by the Adams-Bagnall Electric Co. of Cleveland, O., are unique in that the light tilting arrangement is electrically operated. Pressure upon a button, conveniently located within the car, causes a motor in one of the lights to operate and the lights are tipped forward. Continued pressure brings the lights back to normal position.

Additional Devices.

Among other makers of headlight lenses, hoods, globe devices, etc., are the following: Letts Deflector, Manifold Heater Co., Cortland, N. Y.; Rand Reflector, Rand Mfg. Co., Haverhill, Mass.; Glare Screen, Palmer Glare Screen Co., Cleveland, O.; Offset Reflector, C. T. Sutterley & Co., Philadelphia, Pa.; Stryker Reflector, C. L. Stryker, Buffalo, N. Y.; Ames Reflector, Heinze Electrical Co., Lowell, Mass.; No Glare On, No-Glare-On Co., Watertown, N. Y.; Da-Lite, Jeanette Toy and Novelty Co., Jeanette, Pa.; Primolite, Standard Glass Specialty Co., Morgantown, W. Va.; Mac-Kno Bulb, F. F. MacLean Co., Syracuse, N. Y.; Perrin

No-Glare, Perrin Manufacturing Co., Detroit, Mich.; Omolite, Omolite Co., Jamestown, N. Y.; Holophane, Holophane Glass Co., New York; Crockell, C. W. and C. H. Crockett, Troy, N. Y.; Rite Ray, Reflex Co., Newark, N. J.; Consolidated Sales Co., Milwaukee, Wis.; Full Ray, Purfex Manufacturing Co., Philadelphia, Pa.; O-U-Lite Dimmer, O-U-Lite Co., Racine, Wis.

With so many types of devices available the motorist has no excuse for breaking the law, assuming risks or causing undue annoyance to other motorists who have as much right to the road as he has.

CARS PROVE THEIR ESSENTIALITY

Newer Arm of Transportation System Important Factor in Winning the War Says John N. Willys

"HAVE you considered what a big part the automobile is playing in the winning of the war?" says J. N. Willys, president of the Willys-Overland Co.

"I wonder how many realize that the automobile is as much a part of our vast transportation system as the trains and tracks themselves?

"Did you ever stop to think what happens to men and material after the railroad delivers them to the station? Do you realize that tremendous gain in speed we have achieved in moving men and materials by means of the automobile?

"Of equal value is the intricate use of the automobile made by the American business man. If you walk down the streets of any town or city you'll find the curb lined with automobiles. Every car there represents some one on an errand, and every car there means an hour or two added to its owner's useful day.

"Probably no factor in all of our business machinery is more vital to our success than the automobile. The four million automobiles in this country are traveling millions of miles every day, and every mile they travel is saving time and energy and money.

"In this war, as never before, we are brought to a realization of the overwhelming importance of this newer arm of our transportation system."

INVESTIGATING ROUTES FOR TRUCK TRAINS TO EAST.

A party representing the Engineering Corps of the United States Army and the Office of Public Roads recently left Detroit in the official car of the Lincoln Highway Association for the purpose of making a first hand inspection of the through routes of motor travel from Detroit and middle west points to Atlantic coast ports. The car was driven by H. C. Ostermann, field secretary of the association.

After the choice of a definite route to an Atlantic port a practical test trip by an army truck train will be tried out, according to Roy D. Chapin, chairman of

JOHNSON GOES TO HYATT.

A. R. Johnson, formerly assistant advertising manager of the Cadillac Motor Car Co. of Detroit, has been appointed assistant advertising manager of the Hyatt Roller Bearing Co. He will be associated with W. E. Biggers, advertising manager, in the work of advertising and sales promotion. Before he became interested in the motor car industry Mr. Johnson was engaged in service and promotion work on the Chicago Tribune, in charge of advertising of the Hartmann Trunk Co. of Racine, Wis., and manager of local and foreign promotion on the Milwaukee Sentinel.

the Committee on Highway Transportation of the Council of National Defense and vice president of the Lincoln Highway Association. If this experimental trip proves successful it is planned to drive the army trucks over the route on their way from the factories to points of shipment.

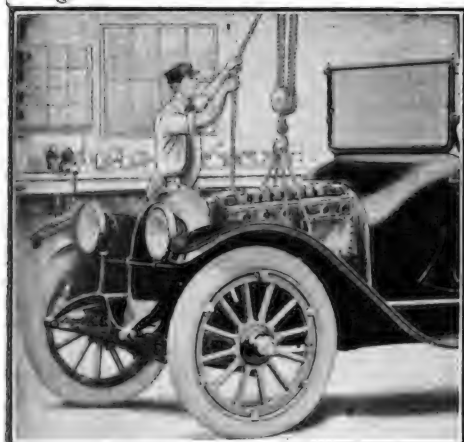
MINING ENGINEER INVENTS NEW CARBURETING DEVICE.

Charles A. Couch, a mining engineer of Worcester, Mass., has announced the invention of a new carbureting device, which it is claimed will save from five to 30 per cent. of gas, as well as increase the efficiency of the fuel from 10 to 25 per cent.

His device is called a turbine mixer. It imparts a whirling or churning motion to the fuel, keeping the air and gas thoroughly mixed as it passes into the inlet manifold. Following tests of the device on light and other cars the inventor took the matter of the invention up with the government.

ACETYLENE STATIONS NAMED.

The Prest-O-Lite Co., Inc., Indianapolis, Ind., has announced the appointment of the following acetylene distributors: J. T. J. Graves Co., Salem, Ind.; Wheeler-Elam Co., 212-216 N. Main street, Valparaiso, Ind.; John and Ira Green, 21 Water street, Pontiac, Mich.; S. Bemrod Auto and Supply Co., 712 Eighth street, Wichita Falls, Tex.; Repass Auto Co., 217-225 W. Fifth street, Waterloo, Ia.; Maxfield Motor Car Co., Inc., Winsted, Conn.; Maxfield Motor Car Co., Inc.; Torrington, Conn.; Auto Supply Co., Estherville, Ia.; Leaman-Pickford Auto Co., 27-29 Second S. E., Mason City; Lechner-Berg Service Station, 215 Walnut street, Muscatine, Ia.; Raymond & Haase, Shenandoah, Ia.; William Warnock Co., 607-611 Douglas street, Sioux City, Ia.; Washington Service Station Co., 110 W. Second street, Washington, Ia.



Overhauling *The* Automobile

PACKARD TWIN-SIX

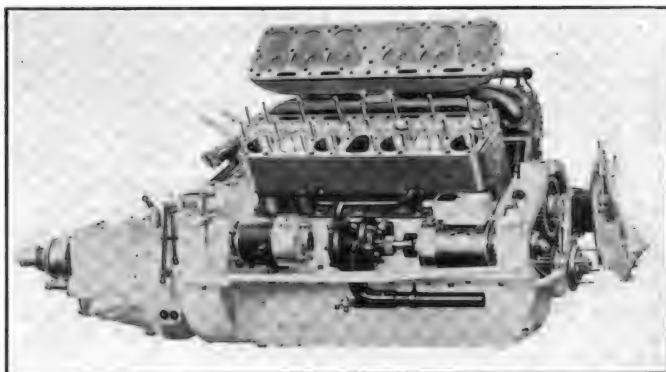
This is the 11th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 12th article of this series will appear in the Dec. 25th issue of the Automobile Journal.

THE Packard Twin Six models, series one, two and three, made in 1916, 1917 and for 1918 respectively, have many points in common and with the exception that series two and three are fitted with removable head engines, are practically the same.

The 1918 model, series three, has a slightly different arrangement for the starting motor, but directions for overhaul are the same for all models. Though the Packard Twin Six engine is a 12-cylinder machine, all parts are extremely accessible and the overhaul can be accomplished by one per-

son with the aid of a block and tackle, which is necessary because of the weight of the cylinder blocks and transmission unit.

Though this article will take the work of overhaul systematically, beginning with the engine, either the transmission



Right Side of 1916 Engine, Partially Disassembled; Showing Motor Starter, Water Pump and Generator.

or the rear axle may be removed for repairs without disturbing the other units. The differential assembly may be removed without disturbing either the transmission or the axle housing, simply by the removal of the wheels and driving axles, disconnections being made as directed later in this article.

How to Begin on the Car.

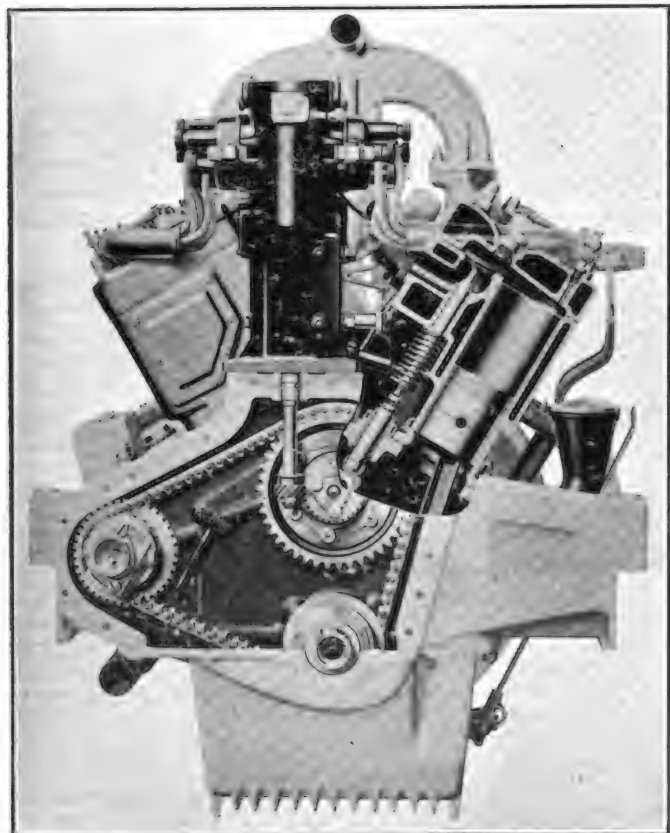
Before beginning the work, whether it is to be complete or partial, the radiator and carburetor with manifold, should be removed, to facilitate access to the various parts. The radiator is connected with the engine circulating system at three points in the 1916 car and two points in the 1917-1918 cars.

In the 1916 cars the two water connections which are screwed to the cylinder blocks should be removed, as should the water hose at the bottoms of the radiator which connects to the thermostat located beneath the water pump.

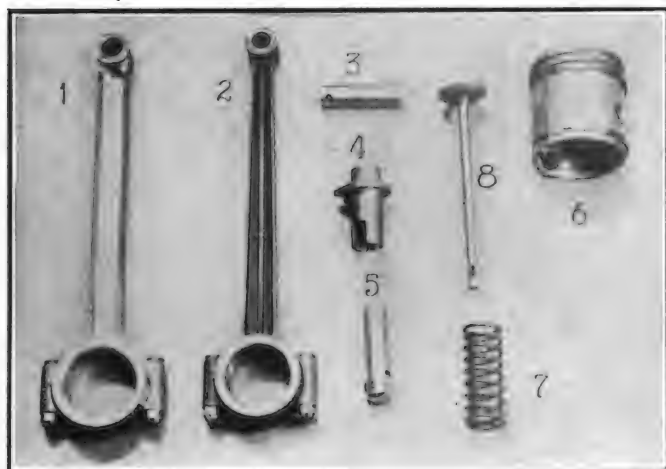
In the 1917-1918 cars there is but one connection at the top with the manifold and one at the bottom with the water pump. Both of these hose connections should be uncoupled. After the two rocker hangers have been unbolted from the frame the radiator may be lifted from the car.

The 1917-1918 cars are fitted with the thermostat at the top and integral with the radiator. This device may be removed entire by the unscrewing of the four machine screws located at the back of the radiator, though unless it is damaged or clogged with deposits it should be left in the radiator.

On all models the carburetor, together with the intake manifold, should be unbolted and removed, after the control rods have been disconnected at the carburetor. If only the valves are to be reground it will be unnecessary to remove the exhaust manifolds, though if the work is in the nature of a general overhaul the manifolds should be removed at this point. These are bolted to the exhaust line through a flange



Front View of Engine, Showing Timing Gears and Driving Chain.



1, Later Type Connecting Rod; 2, 1916 Type; 3, Wrist Pin; 4, Push Rod Bushing; 5, Push Rod; 6, Piston; 7, Valve Spring; 8, Valve.

coupling, and fastened to the engine block by two cap screws at each exhaust port.

In replacing manifold or water fittings use plenty of orange shellac for the joint together with the special gaskets. For the exhaust manifold special asbestos-copper gaskets should be used, well covered with a mixture of graphite and oil.

Gaining Access to the Valves.

To prevent breakage, as well as to afford access to the valves, the distributor carrier should next be taken off. First tag and remove the two wires leading to the breaker box, then give each distributor head a half turn and remove, clearing the unit of all wires. Four cap screws retain this unit to the engine, and when these are taken out the unit may be lifted from the crank case.

The wiring should be left undisturbed. The conduit in which the wiring is carried may be unbolted from the engine and swung upward and back against the dash, leaving the engine clear for repairs.

On the 1916 engine the water jackets were fitted with four top covers, which when removed, rendered accessible the inside of the jackets for cleaning with a wire or stiff brush. The 1917-1918 engines are fitted with removable cylinder heads, as well as four covers located at the backs and fronts of the blocks.

The greatest of care should be exercised to clean thoroughly the water jackets, for if this is not done, accumulations of rust and sediment will seriously impair the effect of the cooling system and the engine is apt to overheat.

For removing carbon, as well as for grinding the valves of

the 1916 model engine, the removal of the spark plug and priming cup caps leaves a large enough hole for the insertion of a scraper or a valve grinding tool.

For removing carbon and grinding valves on the 1917-1918 models, the cylinder heads should be removed. In either case the cylinders, as well as the valve ports, should be stuffed with cloth or waste to prevent the entrance of the grinding compound.

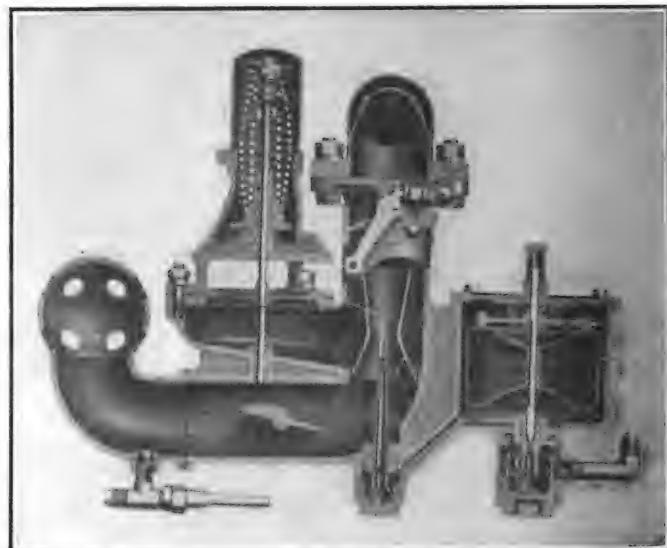
The valve springs being retained by flat keys, a special tool for compressing the springs is furnished by the manufacturers. All of the valves should be numbered to prevent their being interchanged, as each valve works best in its original position.

Working Down to the Engine Base.

After the oil has been drained from the engine base and the try valve or oil overflow valve removed, the small square plate should be taken from the right rear of the crank case and through the hole left, the cap plug connecting the oil pump with the oil manifold disconnected. The base may then be unbolted and removed from the engine, giving access to the engine base.

All of the connecting rods may be removed through the engine base for repairs and replacement. As each connecting rod and piston is removed it should be marked with a number punch so that it may be replaced.

The connecting rod bearings are babbitt, with bronze lin-



Sectional View of Carburetor. This Device Has No Outside Adjustment.

ers or backs, and are furnished by the factory in sets. When connecting rod bearings are replaced one should be sure that the oil holes and grooves are absolutely clean, and that the babbitt is fitted to the crankshaft by scraping.

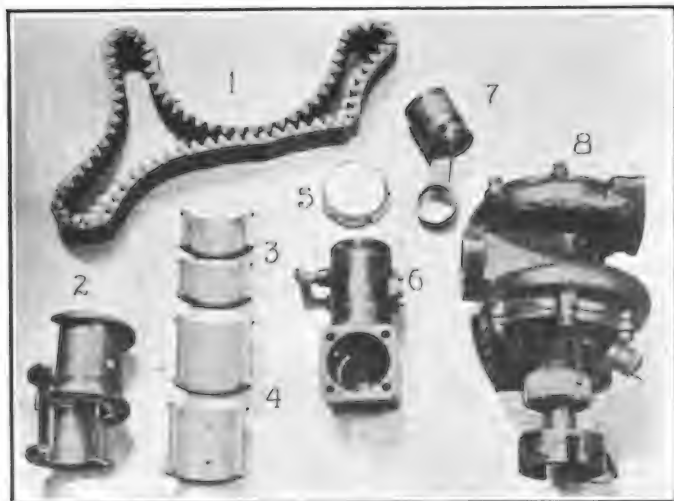
Examination of Oiling System.

Located at the rear of the oil base is the oil pump. This device is driven by a helical gear and consists of two gears and a relief valve arrangement, which prevents excessive pressures. The oil pump may be disassembled for cleaning, but it is advisable not to disturb the relief valve.

A force feed oiling system is used on the Packard. From the oil pump lubricant is forced to an oil manifold or header, from which there are three branches leading to each main bearing. From the main bearings through holes in the crankshaft, oil is supplied to each of the connecting rod bearings. From the top of the front main bearing oil is carried through a passage to the front camshaft bearing and from thence through a hole in the camshaft to each camshaft bearing. From the rear camshaft bearing a passage leads to the pressure gage connection.

A passage connects the front camshaft bearing with the two timer bearings. The 1916 engines had in addition to the above system an oil tube on the connecting rods, which carried the oil to the wrist pins.

All of these passages and tubes should be given a thorough cleaning with a soft copper wire and flushed with



1, Timing Chain; 2, Rear Main Bearing; 3, Front Main Bearing; 4, Centre Main Bearing; 5, Air Pump Cap; 6, Air Pump Body; 7, Air Pump Plunger; 8, Water Pump.

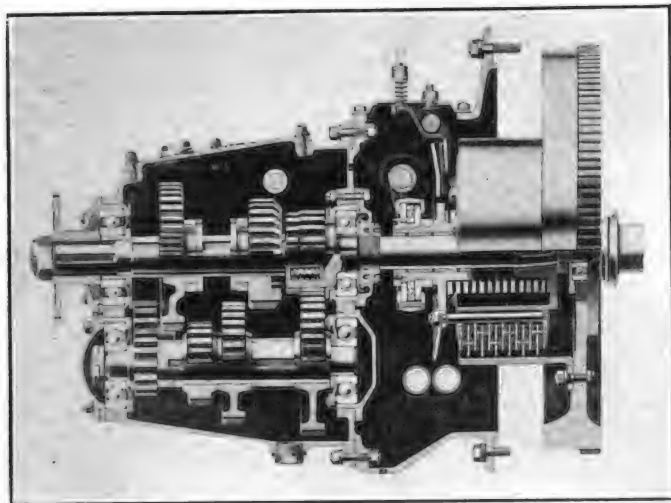
kerosene. For cleaning the passage to the pressure gage the fitting may be removed. A plug fits into the oil passage supplying the timing gears. Remove this plug, which is located directly in back of the distributor unit, and the passage may be cleaned. Connecting rod tubes may be cleaned from the lower end, while the passages in the crankshaft can only be cleaned with kerosene.

The six cap screws which hold the water manifolds to the cylinder blocks and crank case should next be taken out and after the cylinder cap screws have been removed the cylinder blocks may be lifted from the crank case by a block and tackle.

Removal of Auxiliary Units.

Before proceeding further with the overhaul, the various units should be removed from the engine. Tag all of the wires leading to the generator, the starting motor and the ignition coil, and after disconnecting the two leads from the storage battery disconnect the tagged wires.

The starting motor is retained by cap screws to the fly-wheel housing, and when these screws have been taken out the motor may be removed. With the starting motor removed the water pump may be unbolted from the case and uncoupled from the generator unit. The pump cannot be taken from the engine until the generator unit has been re-

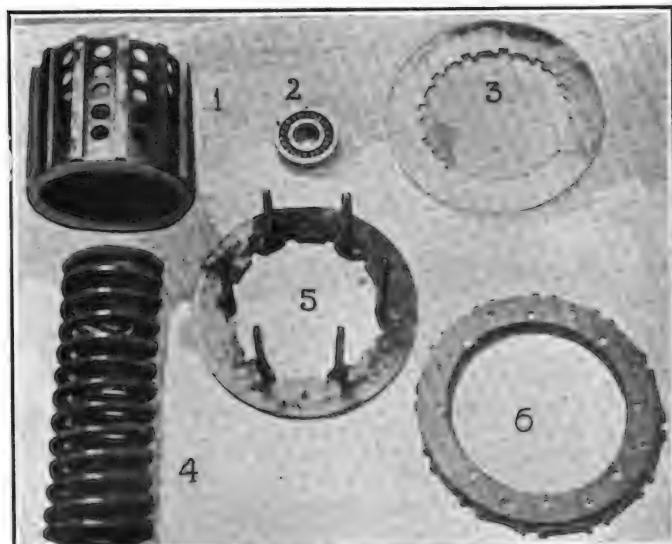


Sectional View of Transmission Gearset and Clutch Mounted in Flywheel.

moved. It may then be slipped forward, twisted over and removed from the engine.

The generator cover on the front of the timing gear case must next be taken off and the nut on the end of the generator shaft removed. The generator on the 1916 cars must be pulled back from the front of the engine far enough to allow the turning of the eccentric bushing and the loosening of the chain. The cap screws holding the front flange to the timing case may then be removed and the generator removed from the car. On the 1917-1918 cars the eccentric bushing is fitted with a locking device bolted to the timing gear case. Remove the lock and turn the bushing until the chain is loose on the gear, then take off the generator. In both cases the water pump must be pulled back before the generator can be taken off.

For all ordinary overhaul work the engine should be left in the chassis. Practically all necessary repairs may be made with the exception of replacing the upper parts of the main bearings, and the repairer, if he be a home mechanic or novice, should not attempt the removal of this unit unless



Clutch Components: 1, Clutch Spider; 2, Clutch Shaft Ball Bearing; 3, Clutch Driven Plate; 4, Spring; 5, Clutch Spider Clamp Plate; 6, Clutch Driving Plate.

such repairs are necessary. If possible the engine, clutch and transmission should be removed as one unit.

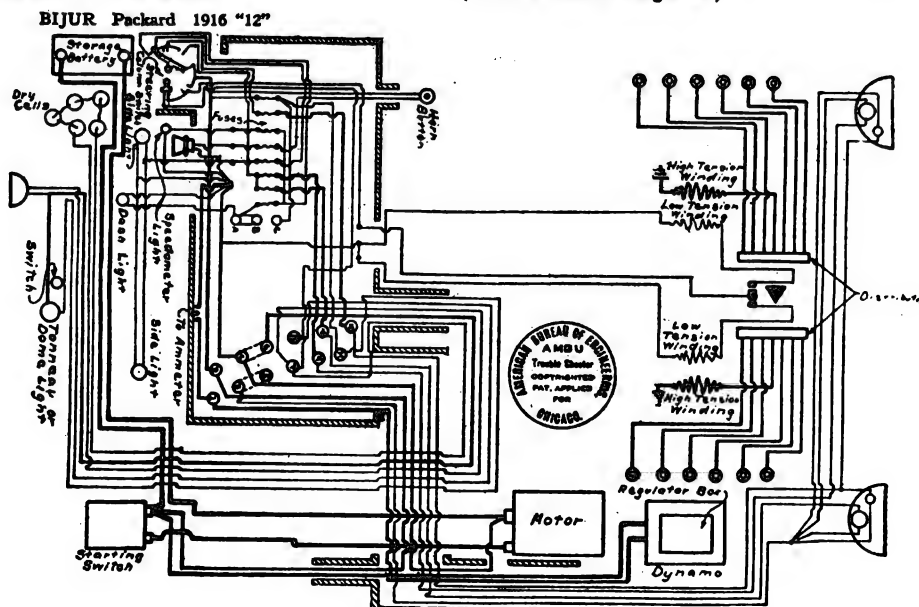
Provision should now be made to support the transmission unit from below, either by means of small horses or boxes. When this is done and the engine disconnected from the frame at the four corners, take out the cap screws which fasten the transmission bell housing to the flywheel housing.

Pass a rope around the crank case and lift the engine forward and upward from the frame. The forward movement of the crank case will have to be considerable, for it will be necessary to slip the clutch drum from the clutch discs. This drum is fastened to the flywheel and is fitted inside with keys which fit into the grooves of the clutch driving plates.

If the transmission is to be taken from the car eventually, it will be easier to remove it from the engine before taking the engine from the chassis. If this is done the universal joint should be uncoupled, the control rods disconnected and the change gear rod with transmission cover removed. The transmission can then be pulled back from the engine after the bell housing screws have been taken out.

Where there are facilities such as are found in the service station for lifting heavy weights, the engine and transmission units are lifted from the chassis together. In the preceding paragraphs directions have been given to remove the cylinder blocks, simply to reduce the weight; though the

(Continued on Page 45.)



Wiring Diagram 1916 Packard Twin-Six.

What Motor Car Industry Means to the WAR

National Automobile Chamber of Commerce Shows the Mobile and Manufacturing Services Supplied and That Can be Supplied

FOLLOWING the offer of automobile manufacturers to serve the government in any way, a survey of the industry has been made by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, to show the kinds of service the motor car is supplying and can supply in the present national crisis. Washington officials are realizing more and more that the present war is dependent upon the motor car industry in as many and possibly in more ways than upon any other industry in this country.

Armies at the front and in the training camps are supplied with food, clothing, ammunition and all other necessities by motor trucks. The armies in Europe are already using 100,000 motor trucks in transportation service. The United States army expects to call for 100,000 trucks for the coming year.

Cars on the Battlefields.

Many thousand motor ambulances are used for removing the wounded from the battlefields.

Paris was saved from invasion by rushing an army of 100,000 French troops in motor cars, omnibuses and taxicabs from behind Paris for the battle of the Marne. Verdun was saved by hurrying up ammunition and supplies in motor trucks when no other transportation would suffice.

British "tanks" made the break in the German line that resulted in the victory at Cambrai. These tanks are caterpillar motor tractors, a type of farm tractor developed in America.

Motor tractors are used for hauling heavy guns.

Armored motor cars have been used with success against rifle and machine gun fire.

Special Cars in Army Work.

Many types of special motor cars are used in army work. They include cars and trucks equipped with wireless apparatus, motor searchlights, motor kitchens, motors mounting anti aircraft guns, motor driven emergency hospitals, motor trucks for erecting telephone and telegraph lines, etc.

Motorcycles are employed almost altogether in the war for dispatch carrying.

American automobile engineers and factories also developed the standardized motor, which will be built by tens of thousands in American automobile factories next year by the standardized quantity productive methods developed in this industry. It is believed these airplanes will materially help to win the war.

American automobile engineers and factories also developed the standardized

The statements of the National Automobile Chamber of Commerce, the great central authority of the motor trade, can be depended upon as authentic and reliable. The progress that has already been made in mobilization of the nation's mobile resources are accurately told in the bulletin issued Dec. 5 by this organization. While it is in the main a review of the items which have been run currently with their happenings in the columns of the Automobile Journal, this review of what the motor industry is doing in war services has the added value of pointing out what it can do and a fair estimation of the reserve powers of private motorists. The survey bulletin is herewith printed in full.—
Editor.

United States army motor trucks and will build many thousands during the coming year. It is only through the standardized production methods developed in the industry that it is possible to manufacture these army trucks in such large numbers and to have the parts in all of them interchangeable. This interchangeable feature will enormously reduce the number of replacement parts that the army will have to carry in stock at the repair depots.

Development of Airplane.

It was the automobile business that made the airplane possible. The automobile manufacturers encouraged the steel manufacturers to evolve special alloy steels that were extraordinarily strong and light and high speed tool steel for working these hard, tough metals.

The automobile industry also developed the high speed gasoline engine that has been adapted to airplane and motor boat work.

The use of motor trucks made it possible to construct the 16 national army cantonments in record time. They hauled most of the material used in erecting the buildings at these cantonments.

Manufacturing facilities of the motor car industry are sufficiently extensive to produce most of the materials required by the army with the exception of food stuffs. Leading motor car companies are already extensively engaged in manufacturing not only motor trucks, motor cars, ambulances and tractors, but are also producing on a large scale gun caissons and parts, recoil checks, mine anchors, shells, etc. It is entirely feasible for

them to make steel helmets, all sorts of forgings, stampings and castings, tents, wagon covers and innumerable other articles of metal, cloth and wood. The rubber tire companies have begun making gas masks and have been making fabric for airplanes and balloons for some years.

Trucks Relieve Railroads.

In response to the call of the Railroads' War Board, motor trucks are rapidly coming to the relief of the railroads in their present critical state of congestion, to care for all short haul freight traffic in and around cities up to distances of 25 to 50 miles. This will enable the railroads to clear the tracks and particularly the terminals for through freight of utmost importance, such as coal, sugar, ore, iron and steel, grain, necessary food stuffs of all kinds, munitions and other army supplies and troops. Taking over of short haul work by motor trucks will release many locomotives, cars and train crews for long haul work.

Army trucks are going to be delivered from the factories where they are built to the seaboard for shipment abroad over the public roads under their own power. They will make the trip loaded with spare parts and supplies and will be manned by the army motor truck crews that will handle them on the other side. Thus they will avoid the use of many thousands of freight cars and hundreds of locomotives.

Officers, automobiles, ambulances and motorcycles for courier service and machine gun batteries can also be delivered by road if desired.

Resources in Private Cars.

Should any eventuality arise, such as the blockade of a railroad, to make it necessary, the thousands of soldiers at any of our camps or cantonments could be moved rapidly by a concentration of thousands of privately owned touring cars of our citizens, and their entire equipment could follow in private motor trucks.

The 4,000,000 automobiles and 400,000 motor trucks and delivery wagons in use in America are a tremendous resource. They are time saving and labor saving machinery that enables more work to be done in a given time by fewer men and horses. Man power is scarce and high priced and horses and mules have been shipped abroad for army use at the rate of half a million yearly since the war began. Motor cars are a necessity to the farmer and motor trucks are equally necessary to manufacturers and merchants who have found it imperative to bring materials long distances by truck and make long distance deliveries to avoid railroad freight embargoes and other rail delays.

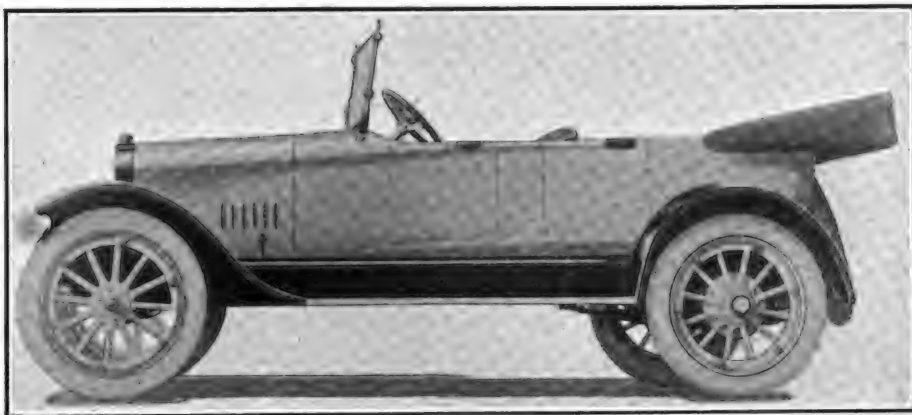
DU PONT PRODUCTS BOOK.

Listing all the products of the E. I. du Pont de Nemours & Co. and its associates, Du Pont Fabrikoid Co., Du Pont Chemical Works, the Arlington Works and Harrisons, Inc., another Du Pont products book has been issued. It is bound in red fabrikoid. A new book will hereafter be issued at least once a year. Aside from its indispensable information to manufacturers, the surprising growth of the companies, the wide ramifications of the explosive business since the incipency of the war is clearly shown in the book.

UNITED MOTORS SERVICE TO OCCUPY NEW BUILDING.

The Chicago branch of the United Motors Service, Inc., which is the local service representative in that territory for Delco, Klaxon and Remy products, has already outgrown its present quarters and will occupy a new three-story building, which will be erected immediately.

This building will have an area of 15,000 square feet and will be located at 2715 S. Michigan avenue, near the pres-



Five-Passenger Crow-Elkhart Touring Car for 1918, an Attractive Job. Priced at \$935.

Crow-Elkart Series K Models

THE Crow-Elkhart Motor Co., Elkhart, Ind., has announced its line of 1918 cars, known as "series K," which includes a five-passenger touring car at \$935, five-passenger de luxe touring car at \$995, four-passenger de luxe clover leaf roadster at \$995, convertible coupe

and it has a slanting oval based windshield, high grade, long grain upholstery and comfortable double deck. There is 46 inches of leg room in front and a 48-inch seat gives additional tonneau space.

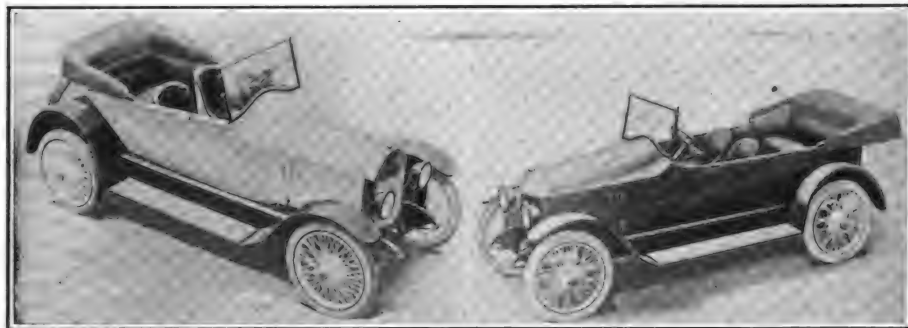
A wide choice of body colors is optional, including olive green, napier green, Richeleau blue, cream, fern green, maroon, white, rover gray, battleship gray and black.

Many refinements and the most up-to-date appointments are found on the other body styles. The motor is the same as used last year, with a bore of $3\frac{1}{2}$ inches and stroke of five inches. It has extra large valves, removable cylinder head and helical cut gears. Lubrication is accomplished by a combination of splash and pump system. Perfect cooling is assured by extra large water jackets, a large honeycomb radiator, circulation being maintained on the thermo-syphon principle. Engine equipment includes a Zenith float feed double jet type carburetor, Dyneto two-unit starting and generating system with the Bendix drive. Connecticut ignition is used with Willard storage battery.

The long wheelbase and extra long springs give the Crow-Elkhart cars extremely fine riding qualities, the wheelbase being $114\frac{1}{2}$ inches and the rear springs 44 inches long and $1\frac{1}{4}$ inches wide. The wheels are of the artillery type, with 12 spokes and fitted with $32 \times 3\frac{1}{2}$ tires.

CROW-ELKHART FOURS.

Cylinders, four, removable head.
Bore and stroke, $3\frac{1}{2}$ by 5.
Carburetor, Zenith, float feed, double jet.
Clutch, Borg & Beck, multiple disc.
Transmission, three speed selective, integral with engine.
Wheelbase, $114\frac{1}{2}$ inches.
Weight, 2295 lbs.
Tires, 32 by $3\frac{1}{2}$.
Rear axle, full floating.



Crow-Elkhart Four-P assenger Deluxe Cloverleaf Roadster and Five-Passenger Deluxe Touring Car.

ent temporary quarters at 2641 Michigan avenue. It will be completed and ready for occupancy on or about March 1, 1918, and will be equipped with complete stocks of genuine factory made parts for Delco, Remy and Klaxon units, and will have exhaustive records of every make of motor car ever manufactured, using either Delco or Remy starting and lighting systems or Klaxon horns. An enlarged service garage will provide for more prompt handling of motorists who drive their cars in for inspection and adjustment of electrical apparatus.

BREATHES ON NEW ERA LIST.

New Era "Better" Motor Requisites is the title of the catalogue of products for 1918 issued by the New Era Spring and Specialty Co., Grand Rapids, Mich. They have added a popular priced running board tire carrier to an already large line and among the novelties introduced is Moto-nose, a new radiator cooling device, or breather.

at \$1195 and convertible sedan at \$1275. Wire wheels are optional on any of the models at \$100 extra.

Many minor improvements and refinements have been incorporated in the new cars, but the chassis is essentially the same as last year, being retained in its fundamental design and principals. What changes have been made are along well tested lines and do not include any experimental ideas. Most notable among these improvements are the unit power plant, the motor and transmission being in unit; a Borg & Beck clutch with self-lubricating bearing; Stewart vacuum feed system; 12-gallon gasoline tank at rear of chassis instead of under cowl as formerly; Timken bearings in all wheels and drive by the Hotchkiss system, through the rear springs. Thermoid flexible universal joints are used this year instead of the all-steel universals, eliminating the need of lubrication at that part and also the use of torque rods or torsion arms.

The latest torpedo design of body is used on the five-passenger touring car,

OFFICIAL KEROSENE CARBURETOR

Government Announces Highly Economic Device for Motor Cars At Its Disposal for the War

AN ANNOUNCEMENT, startling in its nature and of great economic import at the present crisis, was made by the Interior Department at Washington in the form of a statement that the government had been offered the use of a new kerosene carburetor for the period of the war without charge.

The importance of the announcement, however, lies in the fact that the carburetor is evidently a successful one, which means that any doubt as to the sufficiency of the supply of engine fuels for war or domestic purposes is removed. There have been numerous announcements of kerosene carburetors. If successful their widespread use would be assured from the fact that an economy of from 50 to 75 per cent. would be effected in fuel costs. This latest announcement from the government seems to indicate that an efficient device has been invented for utilizing kerosene in internal combustion engines with the same facility as gasoline. No less authority than Van H. Manning, director of the Bureau of Mines, is said to be satisfied after investigation and trials of the device, that it will accomplish consistently everything that is claimed for it.

The inventor has applied for patents on his device and will turn the patent rights over to the government until after the war, but it is not known as yet whether the public generally will be allowed the benefits of the carburetor until production for the government is completed and an ample supply obtained.

There are a number of kerosene carburetors on the market and many are being successfully used on tractors and other motor driven machines of the heavier type, but most of these devices have an auxiliary chamber device for starting the engine on gasoline.

NEW FORD STEEL PLANT A MILE IN LENGTH.

Henry Ford's great new steel plant on the River Rouge, near Detroit, is one of the largest structures of its kind in the world, if not the largest, being over a mile in length from one end to the other. Work is being rapidly pushed on the plant and it is expected that it will be in full operation early in 1920.

S. A. E. MEMBERS WILL DISCUSS LIBERTY MOTOR.

The new Liberty Motor that was developed by several engineers, members of the S. A. E., will be one of the leading subjects of discussion at the winter meeting of that organization in New York during the week of the National Automobile Show there. The principal

topic of this section, which will be, "The Reasons Back of the Liberty Engine," will be taken up in the afternoon program on Thursday, Jan. 10. Major Jesse G. Vincent, who is in charge of the aviation headquarters at Dayton, O., and who was one of the engineers who developed the motor, will be the first speaker, and will deal with the engineering questions involved in the creation of the Liberty engine. Col. Clark, in charge of aviation engineering in the Signal Corps, will open the discussion, which

will be carried on by Capt. Howard Marmon, who will discuss in a comparative way the engineering practices embodied in the Liberty engine as compared with those used abroad, where he recently spent several months.

H. M. Crane, engineer of the Simplex company, who has made extensive study of foreign aviation engines abroad, will also participate in the talk.

EDGAR APPERSON GENERAL MANAGER OF APPERSON BROS.

Edgar Apperson has succeeded his brother Elmer as general manager of the Apperson Bros. Automobile Co., Kokomo, Ind. Elmer Apperson retains the title of president of the company, but owing to ill health has been obliged to relinquish active duties.

COMING EVENTS

SHOWS.

New York, automobile salon, Hotel Astor.....	Jan. 2-9
New York, 18th annual automobile show.....	Jan. 5-12
Washington, D. C., carnival and open house week.....	Jan. 11-18
Providence, R. I., automobile show.....	Jan. 11-19
Philadelphia, 17th annual automobile show.....	Jan. 11-19
Rochester, N. Y., 10th annual automobile show, Exposition Park.....	Jan. 14-19
Milwaukee, Wis., automobile show.....	Jan. 18-24
Montreal, Can., automobile show.....	Jan. 19-26
Cleveland, O., 17th annual automobile show.....	Jan. 19-27
Scranton, Pa., automobile show.....	Jan. 21-26
York, Pa., automobile show.....	Jan. 21-26
Portland, Ore., automobile show.....	Jan. 21-26
Mifflintown, Pa., automobile show.....	Jan. 22-26
Allentown, Pa., automobile show.....	Jan. 23-28
Bridgeton, N. J., automobile show.....	Jan. 26-Feb. 2
Chicago, Ill., national automobile show.....	Jan. 26-Feb. 2
Chicago, Ill., salon, Congress hotel.....	Jan. 26-Feb. 2
Harrisburg, Pa., automobile show.....	Jan. 26-Feb. 2
Manchester, N. H., academy.....	Jan. 28-Feb. 2
Minneapolis, Minn., automobile show.....	Feb. 2-9
Kansas City, Mo., automobile show.....	Feb. 9-16
Kansas City, Mo., third annual tractor show.....	Feb. 11-16
St. Louis, Mo., automobile show.....	Feb. 11-16
Newark, N. J., automobile show.....	Feb. 16-23
San Francisco, second annual automobile show.....	Feb. 16-24
Waterbury, Conn., automobile show.....	Feb. 18-23
Des Moines, Ia., automobile show.....	Feb. 18-23
Syracuse, N. Y., automobile show.....	Feb. 18-23
Grand Rapids, Mich., automobile show.....	Feb. 18-23
Springfield, O., automobile show.....	Feb. 18-23
Pittsfield, Mass., automobile show.....	Feb. 18-23
South Bethlehem, Pa., car and truck show.....	Feb. 18-27
Brooklyn, N. Y., motor vehicle show.....	Feb. 22-March 9
Omaha, Neb., automobile show.....	Feb. 23-March 2
Bridgeport, Conn., automobile show.....	Feb. 25-March 2
Boston, Mass., Boston Automobile Dealers' Association show.....	March 2-9
Trenton, N. J., automobile show.....	March 20-23
Stockton, Cal., automobile show.....	April 9-13
Chicago, Ill., accessory show for Ford accessories.....	Sept. 23-28

MEETINGS.

New York, Automobile Electrical Association.....	Jan. 3-4
New York, Society of Automotive Engineers, annual.....	Jan. 9-10
New York, National Association of Accessory Jobbers.....	Jan. 11-16
New York, National Automobile Dealers' Association (directors meeting), with vice presidents from eastern states.....	Jan. 7-8
New York, annual banquet Motor and Accessory Manufacturers, Waldorf-Astoria.....	Jan. 9
Washington, D. C., carnival and open house week under auspices of Automobile Trade Association of Washington.....	Jan. 11-18

Motor Modes Appropriate For King Winter

Clothes Bearing the Stamp of Authority Costume Hardy
Maids Who Welcome Frosty Days in the Car With Glee

By Mrs. A. Sherman Hitchcock

THE woman who really loves motor-ing in all its different forms wel-comes winter with glee. She loves the stimulation of cold air and keen winds, of gliding over ice covered roads, or snowy country stretches. It re-quires vitality to participate in cold weather motoring in the open car and there are a great many women who prefer the more lux-urious comfort of the enclosed type, but she who is pos-sessed with health and its accompa-nying vitality and spirits, loves the keen exhilaration to be derived from a spin in the open air.

Even the most wonderful vitality, however, must be protected by warm and protective cloth-ing, and the winter motorist is usually very sensible where her clothing is con-cerned. She insists that her motor tog-gery must be smart and becoming, but first of all she de-mands that it be warm and comfort-able. Because of the sturdiness of winter motor garb it is particularly smart when it is well constructed—it must have char-acter and with good materials the clever tailor can achieve exceedingly excel-lent results.

Every jolly motor maid illustrated herewith is perfect-ly appared for the sport in clothes bear-ing the stamp of an authoritative manufacturer and designer, and each garment is most excellently fitted to fulfill its own destiny. The time has arrived when the motor woman does not resort to any hit or miss gathering together of warm enough old clothes when she goes out for a spin; instead,

her costume is up to the very minute of knowingness and to the very last detail correct. Therefore, she makes a smart as well as decidedly attractive figure against the out of doors background.

reaching just below the waist. The ends are sometimes trimmed with a woollen fringe and again are seen gathered at each end and finished by a tassel or a puffy ball of brightly colored wool. The

caps are on the Tam O'Shanter style, with the crown coming to a point and finished with a tas-sel or ball of wool. A Tam of putty col-ored wool has a snug roll of white fitting the head very closely. A white button at the very top of the cap holds in place a loop of white braid, which catches the fullness of the Tam at the white band, finish-ing by a long tassel of white wool. The accompanying scarf of putty color has a two-inch border of white about the edge. This is gath-ered at the ends with long tassels of white wool. Another very attractive scarf is knitted in alter-nating candy stripes of rose and white, and is finished at the ends by stout white balls of wool used as tassels. The Tam which matches the scarf is made very full and with a white head band. A fluffy pompon of white wool is tacked on the middle of the top of the Tam.

There are many very handsome new bags shown for the motor woman's se-lection, and she who cannot find one that exactly pleases her fancy is indeed hard to satisfy. One, the "Hampton," is made

in polished pin seal in brown, gray, green, blue, purple and black. It is decidedly artistic and smart in style and upon investigation one finds re-vealed a most pleasing number of pockets conveniently stowed away, a dainty mirror and purse and the very



A Collection of the Season's Most Particular Fads: Left, Coat of Natural Muskrat; Right, Beautifully Marked Motor Model of Natural Lynx, with Deep Collar, Cuffs and Belt at the Back of Nutria. Courtesy William Jackman's Sons, New York City. Top Centre, Fringed Edged Scarf and Velvet Topped Cap; Bottom, Motor Chapeau of Crushed Plush, with Brim Faced with Satin, Flat Bow and Hand Embroidery, Courtesy New York Manufacturing Co., New York City.

Motor sets, consisting of cap and scarf, made of the warmest of wool materials, are very popular. They are most attractive, as they combine charming colors when in the plaided materials and all the new shades when in plain fabrics. The scarfs are broad and long, usually

latest things in linings. It is a bag which may be used in the car, on the street—in fact, anywhere one goes, which gives it an added value to any woman. The bags made of chiffon velvet are also very high in popularity and may be had in colors matching the coat, sometimes beaded and sometimes plain. Bags of mocha, too, are well liked and are of excellent durability. Vachette leather is familiar to all motor women and still retains its popularity.

Motor Veils from Paris.

Some new motoring veils have just been received from Paris. They are of $1\frac{1}{2}$ yard length, in tiny hexagonal mesh with border of large, closely massed chenille dots in white or in a color. There is a constantly increasing demand for the motor veil with chenille decoration and taupe, purple, copper, rosewood and green seems assured of success. As the colder weather approaches we see many veils of chiffon cloth and even if one does not need the veil when starting away there are many times when it is a welcome acquisition on the way home. Every motorist should carry two or three chiffon veils in her motor bag for her own convenience or for some guest who may need the added protection. The vivacious brunette goes motoring with a scarlet silken veil tied over her chic little turban and the flaming touch of color with her rosy cheeks and sparkling eyes make a vivid contrast with the winter bleakness and her sober surroundings. The dainty blonde motorist wears a blue veil over her yellow hair and makes as ravishingly pretty a picture as it is possible to imagine.

The smart woman motorist is infinitely particular about her motor veil, both as to its color and adjustment. The average woman who motors does not give half enough thought to this important detail of her costume. The face is the focusing point of interest to the observer. No matter how becoming a coat or a hat may be the eyes travel instinctively to the wearer's face. The veil, therefore, coming next the face, is to the critically observant eye a most important detail. In fact, a veil may make or entirely spoil the motorist's beauty—as few women realize. To a fresh girlish face almost any color of veil is becoming, but while certain shades serve to emphasize the brilliancy of bright eyes and rosy tints of a lovely complexion, it in some insidious way renders dull and insignificant eyes that are tired and a colorless skin. The woman over 30 would do well to select her motoring veils and scarfs by the trustworthy aid of a mirror in a strong light.

A Peep Into the Future.

Every woman motorist is delighted to know what is to be worn, as well as what is being worn. All of the garments and the materials which we will wear in the spring are very soon to be exploited at the famous southern resorts, Palm Beach, Miami and Pinehurst. Fashions displayed at these popular winter resorts are looked upon as forerunners of the spring time in the North. In fact,



La Vogue Model of Heavy Wool Velour, Lined Throughout with Printed Pussy Willow Silk. Collar, Cuffs and Tabs of Seal Plush. Colors: Burgundy, Beet Root, Damson, Pekin and Taupe.



Showing Wonderful Adaptability of La Vogue Model Collar, Which is Constructed so That It May Be Made Into a Hood.

many a fashionable motoring wardrobe will be brought back North at the end of the season, renovated and worn with perfect assurance that nothing more modish or higher in popular favor could be found in the latest or rather the newest spring models. The opening of the new season so soon after the closing of the old year and the beginning of the new has its advantages for those who do not go southward, for one may select from these early harbingers with a feeling of the greatest surety and be prepared for the very first spring days that steal into the closing weeks of winter.

The material called to attention is the splendid Dragonia Shantung. It will be one of the most approved materials for motor wear and is possessed of an enduring durability which nothing can excel. The Dragonia Shantungs, as the name implies, belong to the pongee family, only they are a most wonderful improvement over the pongees. They come in several different weights and weaves, from a very heavy quality ideal for the coat or suit, several medium weights of varying quality, to the very light weights suitable for the motor blouse, frock, etc. Never is anything seen in this line that could equal the very heavy quality and one would find it rather difficult to ever wear it out. A coat or suit made from it would certainly be ultra smart and don't forget it will be a leader later on. All the new 1918 models are short, conservatively narrow, simple in design, but altogether smart in effect.

New Colors Shown in Clothing.

There are some very charming new colors shown in motor clothing. A medium dark shade between a rose and a red, called Lanvin red, is particularly good. Serpent green is a dark gray green with a shimmer of silver to it, and Marie Louise is a greenish blue. Queen's purple is a very handsome shade of amethyst. Coats, frocks, hats and veils all come in these shades.

The wise selection of fur garments really amounts to an art, as many motor women who have not given their selection proper attention, have realized to their sorrow. Shown here are two excellent examples of the furrier's skill—models expressly appropriate for motor wear. Both natural musk rat and natural lynx make very handsome coats and are effective in the car. Another fur which is particularly good this season is squirrel, and its soft gray tint is vastly becoming to the majority of women. Beaver and nutria are equally good for motor wear, both very durable and wearing splendidly. We do not see nearly so many of the big bulky coats of fur this season as in former years, for now the manufacturers are giving us far more practical garments of fur—coats which may be worn for "general utility"—both in the car and on the street. There is a large selection this season in fur coats and very many of moderate price, but the fur has not yet been discovered that will oust Hudson seal from its supremacy in point of beauty and all around usefulness.

VIGOROUS ANTI-THEFT CAMPAIGN

Car Owners Everywhere Urged to Mark Cars and Help Check Cancerous Growth in Motordom

IN THE old frontier days, when the vigilance committee made short shift of the horse thief by hanging him to the limb of a tree, stealing as a means of livelihood was precarious at the best and only the most desperate type of criminal persisted in this form of crime. With the automobile, however, conditions are far more attractive for the thief, as the penalty for stealing them is light and but a feeble effort is made in most cases to apprehend the culprit.

Most people carry theft insurance on their cars and when they are stolen they take only a half-hearted interest in their recovery, a condition which has encouraged auto thefts to the point where organized gangs in many parts of the country have been stealing automobiles by the hundreds. Concealing their identity is an easy matter and they find a ready sale. When apprehended the thieves in most cases get off with fines or comparatively light sentences, another fact which has encouraged the practise, so that it has gained alarming proportions.

Insurance companies who write automobile theft policies have already begun to take cognizance of the situation owing to the heavy losses sustained, and it is feared that if some drastic methods of stopping the wholesale traffic in stolen automobiles is not found, that theft insurance rates will become prohibitive. Taking steps toward ameliorating conditions, the Omaha Automobile Club, Omaha, Neb., has issued an appeal to automobile clubs throughout the country to urge their cooperation in a movement to secure more justice from the courts in the shape of more severe penalties for automobile thefts and also to stir the motor car owners from their apathetic attitude when their cars are stolen.

This appeal in part is as follows:

"Auto stealing has increased to present alarming proportions because of two basic facts: Unjustifiable clemency of the courts and apathy of the car owner in his own behalf.

"There are 4,000,000 automobiles in the United States. Even the non-owner admits the automobile a necessity.

"Fully 3,000,000 of the owners cannot afford to lose their cars. Their car is an investment, the same as their home. They use their car in daily business. Stealing a car stagnates business, robs the country's resources and the failure the land over to give the motorist justice due them in the courts is assuredly undermining that confidence the American public bestows in the American bar of justice.

"A thief steals a \$2000 automobile, is caught and tried, facts sustained, yet in the majority of cases a weeping relative or the judge's refusal to realize that the automobile represents so much hard earned money is the cause of either

dismissal or that joke called paroled sentence. The same thief goes to the penitentiary if he steals \$2000 cash.

"A thief is a thief whether he steals cash or automobiles and if the cancerous growth of auto thefts is to be checked the sentence must be the same. There is no such person as a joy rider—he's a thief pure and simple, although on account of tender years clemency is rightly due here sometimes.

"The appalling number of car owners who recover their car and then refuse to prosecute are encouraging another theft. The average business thief knows he has a fifty-fifty chance to get off clear because of the car owner's apathy or the clemency of the courts.

cars has been adopted by a garage in Kansas City, Mo., Rahe's Locust Garage, and is being so utilized that it also proves effective advertising for the garage. This service is given to the motorist free. The proprietor invites anyone owning a motor car to bring it to the garage, where a private number will be stamped on the car in different places so that it will be impossible to eradicate or disguise it and make it valueless as a means of identification. This number is known only to the superintendent of the garage and to the owner. Even if the thieves have cut the number from the engine and have repainted the car, it can be identified by the owner and the garage superintendent by its private numbers. A card is sent out to motorists, inviting them to avail themselves of the free offer made by the garage.

A proper and reliable identification mark on every car where it cannot be located by the thieves will go a long way toward discouraging the wholesale theft of cars, as many police depart-

WHAT TO DO IF YOUR CAR IS STOLEN.

FIRST—Notify the Police Department.

BOTH PHONES 9500.

Give them this information:

Your name.....
Office is at.....Phone.....
Residence is.....Phone.....
My car is a 2-4-5-7 Passenger.....
Car was taken from.....at.....
City License.....State License.....
Body of car is painted.....Wheels.....
Top is made of.....Color is.....
Color of top inside is.....Cushions are.....
Engine Number is.....—2 4 6 8 12 Cylinder

Now give the police some description of your car which will distinguish it from the 20,000 cars in this district. Advise of some mark, like a torn top, scratch on body or fender, light broken, or some mark that will identify your car.

Fac-Simile of Service Blank Furnished Motorists by a Kansas City Garage in Anti-Car Theft Campaign.

"Another thing: Insurance companies will soon refuse to insure automobiles if present thefts continue to increase. Then you, Mr. Car Owner, will assume all the risk.

"This magazine is a link in a nation wide campaign for justice from both the American courts and the American motorist.

"We demand of the courts sentences in auto theft cases commensurate with the crime. The patience of 4,000,000 motorist voters is keyed to the breaking point. One just conviction is worth more than 50 arrests.

"We demand of the motorists full and zealous cooperation, even to the extent of each considering himself entrusted with the welfare of his brother motorists and to urge and encourage prosecution.

"Nearly \$4,000,000,000 invested in automobiles!

"Talk it up! Keep talking! Cooperate!"

The idea of tangible identification for

ments have been unable to obtain a conviction where they knew they were right, but could not give a positive identification, as the numbers and other means of identifying it had been removed.

NEW CHALMERS PRICE LIST.

A new Chalmers price list covering the 10 Chalmers models has been issued. The schedule, which does not include the war taxes, is as follows: Seven-passenger touring car, \$1535; five-passenger touring car, \$1485; duplex, \$1485; standard roadster, \$1485; touring sedan, \$1950; cabriolet, \$1775; town car, \$2925; limousine, \$2925; limousine landaulet, \$3025; town landaulet, \$3025.

PALATIAL HOME IN JERSEY.

William C. Durant, president of the General Motors Corporation, has purchased a palatial home and estate known as Raymere, at Deal, on the Jersey coast.

PLATE XIV.

GARAGE AND SERVICE STATION 125 x 48 FEET

Structural Plan for Business Building Providing Ample Office, Work Room and Storage, Which May Be Erected Anywhere Reasonably

Designed by the Architectural Department of The Automobile Journal Publishing Co.

AS A BUSINESS proposition the combination garage and service station affords the owner a better and more sure means of profit than if he conducted either separately, as the business of furnishing service and housing for cars is so nearly identical one feeds business to the other line and vice versa.

A structure suitable for this business and one that would serve the purpose either in a small city or large one, is presented with sufficient detail to meet the requirements of anyone contemplating the erection of such a structure. It is of ample size to provide garage space for 30 odd cars and still leave sufficient room for overhauling and repair work, being 125 feet in length and 48 feet in width.

In the front of the building will be seen an office and storage room on either side of the entrance. An excavation about the same dimensions as the office, beneath that room, provides basement space sufficient for boiler room, coal storage, various meters and entrance for underground pipes, wires, etc.

Provision for these things should be made in casting the concrete walls of the cellar, which extend eight feet below the grade line and 15 inches above grade, forming an underpinning for the structure as part of the main foundation walls. The foundation walls should be at least 18 inches thick and extend four feet below grade. The concrete mixture for the foundation is composed of one part cement, two parts sand and five parts crushed stone or gravel. The three-inch drain pipes are to be connected with the sewers and all water or gas mains to be in place before the floor is made.

The floor over the boiler room consists of 12-inch I beams with concrete slabs. The remainder of the floor is laid on well rolled or tamped cinders and should be four inches thick in two layers; one three inches thick of same mixture as concrete walls, and a coating of one inch made of one part cement and two parts sand.

Brick is used in the construction of the main walls of the super structure. The side walls are 12 inches thick and 16 inches thick where the truss rests. The trusses are placed 12 feet six inches on centres of 8x12 hard pine, as shown on the detail section of the plan. They rest on plates 12 by 18 by $\frac{5}{8}$ inches. One and two-inch wrought iron rods are used in the construction

of the truss. The roofing unit is made up of two by seven-inch rafters, with seven-eighths inch matched board and three-ply roofing paper.

This form of roof support is essential in a well designed garage, as it eliminates the need of centre poles that would hamper ready manouvering of machines into position. As there is always a constant need of running machines from one position to another in a service station, the absence of any obstructions greatly increases the efficiency of a building for that business.

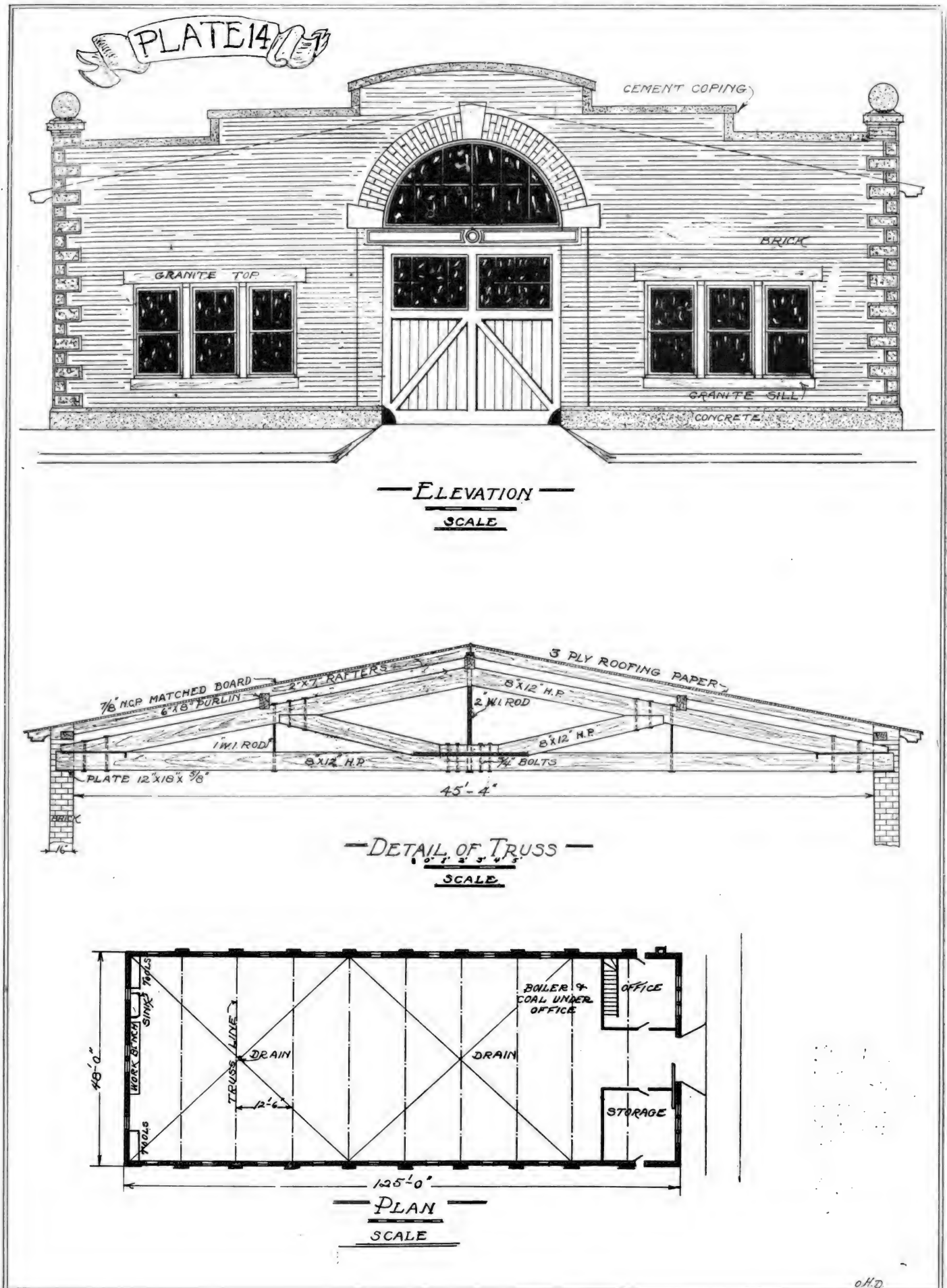
Spaces for the cars may be marked off on the floor by small cement bumpers about six inches high and curbed on the edges to prevent wear on tires. This idea is used in many of the largest garages where cars are constantly coming and going, to assist the operator to back into position with less trouble and eliminate the danger of collision with other cars, as once the rear wheels strike the guides they are obliged to follow the line of their outer edges back as far as the resting position. It also serves as a mark for the spaces so that there will be no argument about a driver occupying someone else's space or taking up more room than necessary.

The front elevation shows the arched door and window tops and sills of granite. A cement coping and ornamental caps provide for an exterior trim, removing all traces of severity of treatment. Ample entrance way is provided in the 10 foot doorway, equipped with a sliding door. A large window over the door surmounting a paneled wooden beam not only adds to the appearance of the entrance, but adds materially to the amplitude of light. Outside doors afford separate entrance to the office and to the storage quarters, in addition to the main entrance.

Plan details show the location of large windows to supply plenty of light. Options are retained to the individual for the layout of electric lights, a section for machinery and repair space.

In arranging for the heating system the owner should choose the kind of boiler adapted to his climate and coal supply, though, in general, in the distribution it would be necessary to use the wall pipe system.

Costs being subject to large fluctuations in choice and supply of materials might be expected to vary in this sizeable structure according to location and labor supply from \$6500 to \$10,000.



Advertising The Trade Mark

Legal and Practical Value of Testing and Establishing the Firm's Most Effective Salesman

By L. W. MIDA.

President of Mida's Trade Mark Bureau, Chicago.

THE trade mark is the greatest salesman in the world of commerce and not the least so in the markets at home.

American manufacturers appreciate this. Ocular demonstration of the fortunes being built daily through the use of trade marks and brands has shown them. Nowhere on this earth is the favorite brand of the buyer or consumer more insistently called for than in the United States.

When a concern puts a new line or item of goods on the market it usually, therefore, adopts a trade mark or brand. It engages an artist, engraver or lithographer to get up a nice looking and attractive mark or label. The services of a patent attorney are employed to make a search through the files at Washington. The trade mark is duly registered. To the minds of the registrants all is finished; they have fully protected themselves and they proceed to spend money in popularizing the brand or trade mark in their own particular way.

But—they have only scratched the surface. Besides registering a trade mark they may have registered a "bunch" of potential trouble that will give them many sleepless nights and worrying days.

Their trade mark or brand may not be worth the paper it is printed on; and this in spite of the Washington registration and other precautions.

For every trade mark that has been registered at Washington during many years there are hundreds that have never been registered. And every user of those unregistered brands may have a prior right to use his mark under the common law. He is protected under the common law and can make it legally hot for the concern who uses even a colorable imitation of that mark or brand.

A concern which has not taken the necessary publicity and search meas-

ures may be using a mark or brand that is an infringement on some other hidden away in a corner of the United States. It may be doing it innocently, but some day the hand of fate will fall heavily on its shoulder and an expensive law suit may be the consequence through that ignorance.

The condition of uncertainty is vividly illustrated by the experience of a Chicago organization specializing in research and registration of trade marks. They find that of the marks submitted to them, close to 75 per cent. are in conflict with the same or similar marks in use by competitive concerns, or that the mark is not of such a character as to be a subject for protection by federal registration. While the records of the bureau have been compiled with fidelity and regardless of expense for over a quarter of a century, and the records are as exhaustive as humanly possible, there is still another channel of search that should be used—advertising in the trade press. This advertising should start with the very inception of adoption of the trade mark.

A campaign of advertising in the trade press, as a continuous warning, has its own distinctive value. If the trade mark advertised is all right there is little to fear, but if it is all wrong—and recollect once more the percentage of rejections mentioned—the advertiser is prevented from spending a large sum of good money in promoting it.

The Federal courts have taken note of this phase of trade publicity. The courts have also on several occasions indicated that where an owner of a trade mark is not prepared to make universal proclamation of possession, it will be regarded as evidence of his intention to conform to the spirit of the law if it is shown by him that a fair amount of advertising has been done in his trade press.

C. F. KETTERING NOMINATED FOR PRESIDENT OF S. A. E.

Nominations for the elective offices in the S. A. E. for 1918 have been made up by the nominating committee and they are headed with the name of C. F. Kettering, vice president of the Dayton Engineering Laboratories Co., for president.

The other nominations are as follows: First vice president, David Beecroft; second vice president, C. C. Hinkley, president and general manager of the Hinkley Motors Corporation; second vice president, representing aviation engineering, G. H. Houston, consulting engineer, New York; second vice president, representing tractor engineering, Fred Glover, vice president Emerson-Brantingham Co.; second vice president, representing marine engineering, H. R. Stuphen, vice president of Elco Co., Electric Dynamic Co. and Submarine Boat Corporation; second vice president, representing stationary internal combustion engineering, H. R. Brate of the National Gas Engine Association; members of the council to serve two years, Charles S. Crawford, associate engineer, Premier Motor Corporation; Charles M. Manly, vice president and chief engineer of the Curtiss Aeroplane Co., and J. V. Whitbeck, chief engineer Chandler Motor Car Co.; treasurer, Charles B. Whittelsey, vice president and factory manager of the Hartford Rubber Works Co.

STUDEBAKER OPERATING SOME OF ITS NEW BIG PLANT UNITS.

The Studebaker Corporation, South Bend, Ind., has started manufacturing operations in several of the units that were included in the big \$2,000,000 plant expansion work started in the early summer. One of the buildings, a four-story dry kiln, is one of the largest and most complete structures of its kind in the world. It is built of reinforced concrete and cost \$750,000 and is used for seasoning the millions of feet of lumber that is used in the many different Studebaker products.

ACCESSORIES MANUFACTURERS SANCTION AERONAUTIC SHOW.

The Motor and Accessories Manufacturers, Inc., has sanctioned the Second International Pan-American Aeronautical Exposition, which will be held in New York on the second floor of the Grand Central Palace during the week of Feb. 16-23.

DECOU PLANNING NEW INVENTION.

Jerry W. DeCou, inventor of a revolving gun turret used on armored motor trucks, has resigned as factory manager of the Smith Motor Truck Corporation, Chicago. He will take up some private research work for a short time before again identifying himself with a prominent concern in the automobile, truck or tractor industry.



Fleet of 14 United States Trucks Recently Delivered to the United States Government for Service at Army Cantonments.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

Problem of Stolen Vehicles Stirs Authorities

New York City Alone Copes With 874 Cases in First
Six Months of the Year—Special Marks and Insurance

THE loss of motor vehicles through theft in many localities during the past year has become so alarming that the public authorities are now giving the matter very serious consideration. These thefts are more frequent in the larger cities of the country and in some of them it is indeed alarming.

For instance, in New York City alone, for the first six months in 1917, 874 cars were reported stolen, over 145 a month, or more than four a day. Of these 758 were recovered and 283 arrests were made, leaving 116 still missing. Of the 758 recovered cars 164 of them are listed as doubtful cases of theft, because they were recovered within 24 hours after being stolen, and many of them only a short distance from where they were taken, and nothing had been removed from them. If these cars had been locked by some method or other the number of thefts would have been much less. Under actual joy riding thefts the number reported for the first six months was 119, of which 40 were traced to chauffeurs, and 79 of them to other persons.

In discussing the automobile theft problem a point that is overlooked by many owners is that nearly every other person knows how to drive a car, a condition that did not exist a few years ago.

The secretary of state of New York, Mr. Francis Hugo, has been studying the problem, as well as the police department of the city of New York, and Mr. Hugo has written a letter to automobile organizations of his state asking their opinion

on his suggestion that the manufacturer's number, which now appears upon the motor, be affixed also on the steering column of the automobile.

"This is a part of the automobile," he says, "which is rarely, if ever, changed, and the numbering of this part to correspond with the engine number would serve several purposes.

"In case of theft it would prove of great value in identifying the car. Also, it would act as a deterrent, as the removal of this number by the thief would be readily discernible.

"Again, it would save the purchaser of a car a great deal of trouble in making application for registration, as the number would be easily located.

"The affixing of the motor number at a point, say six inches below the steering wheel, would entail little if any extra expense on the part of the manufacturers. I believe this is a matter which might properly be presented to the manufacturers by the dealers through whom the cars are sold and make the suggestion accordingly."

Meets Insurance Approval.

The manager of one of the large insurance agencies which writes several thousand policies every year for automobile fire and theft loss, said he was in full agreement with the secretary of state's suggestion.

"It is a matter that the manufacturers should readily agree to," he added, "as a means of contributing to the better protection of buyers of their cars. The expert automobile thief today knows so

well how to remove the manufacturers' number, replacing it with a spurious one, that if the number is the sole method of positive identification it is practically impossible to identify it. The only absolute protection the owner now has is to place a secret mark on some part of the car, but as a fact the owner virtually never does it.

"The owner himself can do a great deal more than is usually done toward mitigating the automobile theft evil. The carelessness shown by scores of owners in leaving their cars unprotected and unlocked in the streets is amazing. There is no locking device that the expert motor car thief cannot beat, if he is determined to steal a car and has the opportunity to do so. Nevertheless, it is a valuable preventive, and if observed more carefully it would reduce by a large proportion the number of cars reported stolen, but which have been used for joy riding. Many cars which have been technically stolen are recovered within 24 hours. Meanwhile an alarm has been sent to every police precinct in the city. The owner is miserable because he believes his car has actually gone, and if insured he prepares to collect as early as possible from the company. If the owner had merely been thoughtful enough to lock his car it would have stopped the average joy rider from going off with it."

LOST—National Highways Association eagle No. 3569 was lost between Framingham and Milford, Mass.

LADIES FIRST; CAREFUL DRIVERS

Women Car Operators Score Low Per Cent in the Massachusetts Survey of Accidents

NOT alone in the political field is woman forging ahead. If reports indicate anything women are rapidly becoming the most careful of motor vehicle operators. Time was, and not so long ago either, when a woman operator of an automobile was regarded as a distinct menace upon the highway, but the Highway Commission of Massachusetts has gone a long way to show by an exhaustive investigation of all the facts connected with the more serious of motor vehicle accidents in the commonwealth during the last eight or nine years that the former public impression regarding women operators is untenable today.

Six investigators spent two weeks making a careful study of 675 selected cases of serious accidents, and compiled a report the results of which are published in the annual report of the commission for 1916. As a result the commission makes the following statements:

"The public has many erroneous ideas as to what causes automobile accidents. * * * The impression gets abroad that most of the accidents are caused by reckless or drunken operators running at excessive speeds, and that many operators are never caught. These impressions are not correct in fact in any large proportion of the accidents.

"Out of 675 cases examined the operators were believed to be intoxicated in 42 instances only, or in just about six per cent.

"Women are unusually careful operators, being involved in only four per cent. of all the accidents, although they constitute about eight per cent. of the licensed operators. They were held 'not at fault' in seven out of eight fatal accidents.

"In the 265 cases in which 243 pedestrians and 22 others were killed the pedestrian or other user of the highway was wholly at fault in 162 and partly to blame in 43. The operator was wholly at fault in 54 cases and partly to blame in 43.

"Two hundred and five deaths out of 625 would not have occurred if reasonable care had been exercised by the deceased. In more than half of all the cases in which pedestrians and other users of the highway outside of the motor vehicle were either killed or injured, the accident would not have occurred if the ordinary precaution had been taken of looking before crossing.

"In 433, or in nearly two-thirds of these cases, the motor vehicle was going at less than 18 miles an hour, and in 218 was going at less than 12 miles.

"In 1915 there was one fatal accident for every 381 registered motor vehicles, while in 1916 there was one fatal accident for every 468 motor vehicles regis-

tered. This certainly indicates more care and caution on the part of some one.

"The number of automobiles and trucks in Boston increased over 33 per cent. during the year, while the number of deaths caused by them only increased seven per cent. and the injuries only 15 per cent."

PEDESTRIANS IN HIGHWAY ACCIDENTS.

In some interesting statistics recently promulgated by the New York State Commissioner of Health at Albany, concerning the causes of highway accidents, he says the number of fatalities due to automobiles showed a marked increase and was greater than the combined deaths from typhoid and scarlet fever during September. The commissioner noted that there were less deaths from typhoid fever than the average for the same month in past years. These figures, he added, indicates the imperative need for the stringent enforcement of traffic regulations against reckless drivers, as well as pedestrians who are careless in streets and highways which they must share with vehicles. The commissioner apparently ignores the fact, however, that while automobile accidents increased the number of automobiles in use also increased, and the ratio of accidents to cars did not increase, and that the increase in the use of motor vehicles and the decrease in horses in the cities contributed materially to the decrease in typhoid and scarlet fever and other infectious diseases through reduction of the fly danger.

There is no city in the country which enforces the vehicular regulations more strictly and efficiently than does the city of New York, yet after years of study of this problem the police department of this city contains the following in its annual report for 1916.

"Should a law be passed giving the police some control of the movements of pedestrians, and should the enforcement of the law be supported by proper public sentiment, it is quite likely that not only will the increase in street accidents be checked, but that a decrease in the present number may be accomplished."

In Massachusetts, according to a recent report of the Highway Commission, the substance of which may be found in these columns under the heading "Ladies First," three-fifths of the highway accidents are caused by the carelessness of pedestrians. It is certain that there will be a considerable lessening in deaths and accidents if pedestrians will get into the habit before crossing streets and highways of recollecting the laconic wording of the signs posted at railroad grade crossings, "Stop, Look, Listen."

POLICE ACTIVITIES.

Boston. The police of this city, especially in the Dorchester, Brighton, Roxbury, Mattapan, Jamaica Plain and South Boston districts, are strictly enforcing the laws relative to the illumination of the rear number plates. The law, effective throughout the state, provides that lights shall be so placed that the rear register number shall be plainly visible at a distance of 60 feet.

Salem. The anti-dazzling headlight law is also being strictly enforced in Salem. Many arrests have already been made.

NEW JERSEY LAW MODIFIED.

Motor truck owners operating in New Jersey will be pleased to learn that the new act regulating the use of commercial motor vehicles, which was to go into effect Jan. 1, 1918, and which was regarded as over severe for motor trucks, has been modified by Commissioner Dill.

Under the new law the speeds were reduced to 12 and 10 miles per hour for three and five-ton trucks. This prohibition is removed and the present law left in effect.

Under the new law it would also be unlawful to carry more than two-thirds of the combined weight of vehicle and load upon the rear wheels. All existing equipment is now exempt from this provision, though it is not clear how it will affect new equipment after Jan. 1.

Study of the allowable weights to be carried on tires indicates, however, that with normal loading new trucks as at present designed will qualify under the section.

For example, a five-ton truck, loaded and weighing about 21,000 pounds, with a 40-inch diameter wheel, equipped with six-inch dual tires, can carry on each rear wheel 7562 pounds, or a total weight on both rear wheels of 15,124 pounds. The total allowable weight would then be 22,686 pounds, which is sufficient.

The allowable weight per inch of tire is increased 10 per cent., or to the weights shown in the following table, giving the gross wheel load in pounds:

Diameter of Wheel and Carrying Capacity.

		Single Inch Tires.					
		32	34	36	38	40	42
2	.....	621	654	687	726	759	792
2½	.....	924	979	1034	1089	1144	1189
3	.....	1237	1309	1375	1446	1512	1584
3½	.....	1556	1639	1721	1804	1896	1969
4	.....	1859	1958	2062	2167	2271	2370
5	.....	2575	2612	2750	2887	3025	3102
6	.....	3096	3267	3437	3613	3784	3954
7	.....	3712	3921	4125	4334	4537	4746
		Double Inch Tires.					
		32	34	36	38	40	42
2	.....	1237	1307	1375	1443	1512	1582
2½	.....	1844	1952	2062	2172	2282	2392
3	.....	2475	2612	2750	2887	3025	3162
3½	.....	3107	3272	3437	3602	3767	3932
4	.....	3712	3916	4125	4334	4537	4741
5	.....	4950	5225	5500	5775	6050	6325
6	.....	6187	6534	6975	7221	7562	7909
7	.....	7425	7837	8250	8662	9075	9487

The section requiring governors on trucks is changed so as to exempt all present trucks.



Good Roads, Traffic Rules and Parking Places

RESOLUTIONS.

Whereas, it is essential that all transportation facilities of the nation should be brought to the highest state of efficiency in order that food stuffs may be moved most economically from the farm to the market, that manufactured products be moved at the lowest cost from the factory to the consumer.

Whereas, the public highways offer a good, prompt and economical means to supplement transportation by rail and water.

Therefore, be it resolved, that the prompt improvement of our public highways is important and should be forwarded in every proper way.

AT THE recent convention of the Chamber of Commerce of the United States, held at Atlantic City, the accompanying resolutions which were adopted ought to attract the attention of the Federal authorities to the necessity of the immediate building of national highways to be used as military and post roads. The United States is the one great nation of the world which does not maintain a system of national highways. From time immemorial no governmental undertaking has proved of such material benefit to the peoples of a great country as have good and substantial highways; and nothing which the Federal government could undertake and complete would be so beneficial to the social, material and financial development of this great country as would a great comprehensive system of highways for military and other national purposes.

THE following editorial in a recent issue of the Fall River Herald conveys some sane suggestions upon the difficult problem of handling automobile traffic. It is evident that the time is not far distant when municipalities will have to set aside certain streets or places to be used as parking sites for motor vehicles in order to relieve the congestion in thickly settled and business thoroughfares. The before mentioned editorial, we believe, should commend itself to the serious consideration of municipal authorities.

"The abandonment of the project to provide a parking place for automobiles convenient to the centre of the city encourages the renewal of a demand for the enforcement of a traffic rule limiting the time when automobiles may be left unattended in certain of the business streets during business hours. The practise of leaving cars for a long time in places where they discommode other traffic is a nuisance of long duration in this city. Other cities do not tolerate it and it should not be tolerated here. People who want to pull up at the curbstone for the purpose of doing business in stores or offices nearby should not be forced out of their way because others have preempted the space and are holding it at their own convenience, sometimes half a day at a time. As has been remarked before, the business section where this nuisance now exists is not so extensive that a public parking place is necessary to relieve it. There are plenty of nearby side streets that can be used without causing general inconvenience, and the owners of automobiles should be required to move into them after a reasonable length of time that their cars have held one place on the busy thoroughfares. The inconvenience to them totals less than to the general public, which should have the first call on the use of the highways. The settlement of the parking place issue for a considerable time at least warrants the proper authorities taking up for consideration again some workable rules that will keep

the business streets reasonably open during the middle of the day. Such a code of rules is in existence and has been made public, but has never been adopted. With certain modifications those rules, or others similar to them, should be put into force without further delay. Even on the approach of cold weather, when not so many automobiles are abroad as at this and the summer season, the conditions are sufficiently objectionable to call for a remedy; and a careful study of those conditions will conserve public convenience while it puts the owners of automobiles to no unreasonable inconvenience."

Woburn, Mass., Traffic Rules.

Woburn. Automobile operators and owners have been given a shock in Woburn during the past few days by the activities of the police in holding them to a strict observance of the traffic laws, insisting on proper recognition of every ordinance feature. The police are carrying the crusade to the limit, and the chief of police has issued a warning that violations will be tolerated for only a very brief period longer and then the court will have a chance to apply some pressure.

For years, owing mainly to the poor condition of Woburn streets, particularly in the centre, the motorists have been permitted to make their way about the city almost as they chose. The street surfaces generally were so rough that speeding was out of the question.

The City Council last year adopted traffic rules and though they have been somewhat enforced, still no rigid rules have ever been made to apply.

Following are the ordinance provisions which apply to the present crusade:

Section 45. The following rules shall be observed by all persons making use of the streets in the city.

First. A vehicle turning to the right into another street shall turn the corner as near to the curb as practicable.

Second. A vehicle turning to the left into another street shall pass to the right of and beyond the centre of the street intersection before turning.

Third. A vehicle crossing from one side of the street to the other within the limits of the business district, shall do so by turning to the left so as to head in the same direction as the traffic on that side of the street. No vehicle shall stop, in the business section, with its left side to the curb.

Fourth. In no case shall a vehicle remain backed up to the curb, excepting when actually loading or unloading.

Fifth. Unless in an emergency or to allow another vehicle or pedestrian to cross its path, or on the order of a police officer, no vehicle shall stop in any public street or highway of this city, except close to the curb line.

Sixth. No vehicle shall stop or stand within the intersection of any streets.

Seventh. In slowing up or stopping a signal shall always be given to those behind by raising the whip or hand vertically.

Eighth. Vehicles moving slowly shall keep as close as possible to the curb line on the right so as to allow faster moving vehicles free passage on the left.

Ninth. Vehicles must stop so as not to interfere with or prevent the passage of pedestrians at crossings, and at all times drivers of vehicles must stop the same on a signal from a police officer.

Tenth. No person having charge of a vehicle in a public street shall refuse or neglect to stop the same or place the same as directed by a police officer, any of these rules to the contrary notwithstanding.

Eleventh. No person shall drive or conduct any vehicle in such condition, or so constructed, or so loaded, as to allow its contents to fall, blow, leak or sift upon the public streets.

Twelfth. No person having charge of a vehicle in a public way shall allow the same to stand within 15 feet of a fire hydrant.

Thirteenth. No person shall allow a motor vehicle to stand in any street or public way unattended, without causing the engine to be shut down completely.

Fourteenth. No person shall allow a motor vehicle to stand in any public street or way at any time between one-half hour after sunset and one-half hour before sunrise without having its lights turned on.

Worcester, Mass., Traffic Rules.

Worcester. At a recent meeting of the Board of Aldermen of this city the amendments to the ordinances and traffic rules were enacted as here noted:

The driver of any vehicle, when passing a street railway car traveling in the same direction may drive either to the right or left of said car, except on Front street, and on Main street, between Lincoln square and Chandler street, but shall not drive to the left of said car unless there is an unobstructed view of the road ahead for at least 100 yards.

Rule 36 has been struck out and the following substituted:

A person driving or controlling any vehicle on Pleasant street, between Main street and West street, shall not permit such vehicle to stop or stand upon Pleasant street, on either side thereof, for more than one hour except by written permission of the chief of police.

And provided further that a person driving or controlling any vehicle on Pleasant street between Main street and Chestnut street shall not permit such vehicle to stop or stand upon Pleasant street, on either side thereof, between 11:30 o'clock a. m. and 1:30 o'clock p. m. and between 4:30 o'clock and 6:30 o'clock in the afternoon, except while taking on or discharging passengers or loading and unloading merchandise, except by written permission of the chief of police.

Rule 42 was also struck out and the following substituted therefor:

A person driving or controlling any vehicle shall not permit said vehicle to stop or stand upon the following streets for more than one hour, and for that time only on the side of said street designated, except by written permission of the chief of police:

Southerly side of Central street from Main street to Commercial street, southerly side of Exchange street from Main street to Commercial street, southerly side of Foster street from Main street to Commercial street, southerly side of Mechanic street from Main to Commercial street, Norwich street, southerly side of Front street from Church street to Main street, easterly side of Waldo street, southerly side of Franklin street from Allen court to Portland street and on the northerly side of said Franklin street from the easterly side of the mall to Salem square, northerly side of Madison street from Main street to Beacon street, southerly side of Irving street, southerly side of Chatham street from Main street to High street, southerly side of Austin street from Main street to Chestnut street, southerly side of Elm street from Main street to Chestnut street, southerly side of Maple street, southerly side of Walnut street.

Boston Traffic Rules.

Boston. In order to better facilitate traffic operations in the shopping district during the holiday season special new rules reducing automobile and other vehicular privileges is likely soon to be adopted.

The City Council has received complaints that the congestion in Washington street and cross streets has not been completely remedied by the removal of the cars from 10 a. m. to 5 p. m. The approach of Christmas is likely to intensify present conditions.

May Give Parking Space.

Chairman Goodwin, after further consultation with his colleagues and the police, is likely to abolish the two-minute rule on Washington street, between Avery and Winter streets, under which vehicles are now permitted to stop for that length of time. He may also alter the 20-minute rule affecting Winter and West streets, Temple place, and perhaps Bedford street; prohibit unloading freight after 10 a. m. in certain streets of the shopping district, and establish a zone system in Washington street from Essex to Milk street, by which during the hours when there are no cars vehicles shall keep to the car tracks, leaving the rest of the street to pedestrians.

The possibility of establishing parking space in Charles street for automobiles as a further relief and partial substitute for reduction of the privileges under the present 20-minute rule is also under consideration.

HIGHWAY CONDITIONS.

Woburn, Mass. Lexington street from Pleasant street to the Woburn-Lexington line is now open to the public. This highway, which has been under construction for a considerable period, makes a most delightful connection between Woburn and historic Lexington.

"OWNER" AND OWNER'S RIGHTS DEFINED.

In two actions of tort tried together recently in Massachusetts, the first alleging the plaintiff's intestate's due care and the negligence of the defendant in operating an automobile, and while so negligently operating, the automobile collided with the plaintiff's intestate, who was thereby killed, and for conscientious suffering; the second, alleging practically the same complaint and further charging the defendant with negligence in suffering the automobile to be operated without being properly registered. Upon the close of the testimony the defendant's automobile company in this case asked the court to direct a verdict for the defendant for several reasons assigned. Questions were submitted to the jury, which answered the questions, and returned a general verdict for the defendant.

It appeared that the defendant company was a corporation engaged in selling automobiles and delivered to another defendant, one Nicksa, an automobile under an agreement in the form of a lease, which was a conditional sale. The amount agreed upon was to be paid in installments called "rent," and when fully paid obligates the "lessor" to transfer the title to the "lessee" when the first payment shall have been made "within the term of the lease." It expressly provided also that "all money paid as rent shall be applied and accepted toward such purchase," and that the price of the automobile shall be \$317.70, coincidentally, the same sum of money which the lessee by signature and seal promises to pay.

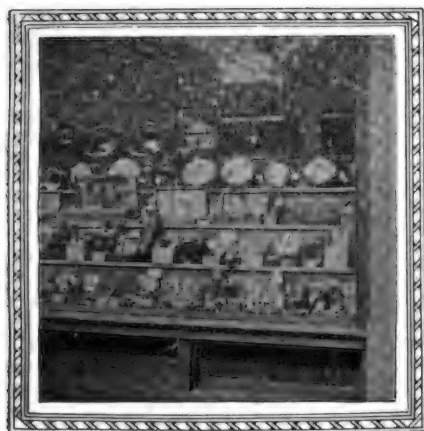
The court said that it is settled that the vendee in possession of personal property under a contract of conditional sale or lease, who has committed no breach of the terms of that contract, has a special property which he can sell or mortgage. And, further, that it was decided in a recent case that the word "owner" in the automobile statutes of 1909 and 1912 "includes not only persons in whom the legal title is vested, but bailees, mortgagees in possession and vendees under conditional contract of sale which confers ownership as between them and the general public for the purposes of registrations.

POLICE ACTIVITIES.

Lawrence. The state law prohibiting the driving of motor cars nearer than eight feet of a street car stopped to take on or let off passengers is being enforced in this city. This salutary law should be observed by motorists everywhere. It causes little hardship upon the motorist and is a real relief to pedestrians.

Concord. The police of this town are also strictly enforcing the rear light law.

Fall River. The Massachusetts Highway Commission has begun a campaign against the use of dazzling headlights in this city.



Accessories Department



THE LYDON SPEEDLER.

In these times of war the conservation of gasoline is as paramount as the conservation of food, for gasoline is the food of the ambulance, aeroplane, tank and truck. The Lydon Speedler is an automobile accessory, the prime object of which is the saving of gasoline.

This device is attached just above the carburetor and projects into the manifold. In action it is controlled by a lever on the steering post, just below the wheel, which admits more or less cold air into the manifold. It also serves as an air brake when opened wide with switch turned off, as it then fills the cylinders with cold air, thereby giving extra compression.

It also serves as a decarbonizer by drawing kerosene or other decarbonizing mixtures through intake manifold into cylinders while engine is running.

It is sold on an absolute money back guarantee and may be applied in a short time by any garage man.

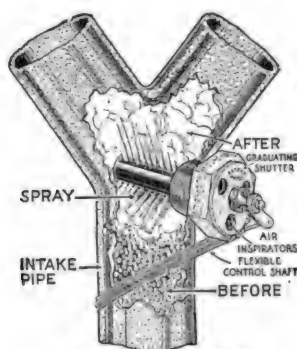
Distributed by M. L. Worcester, Winthrop, Mass. Price, \$5.

SLY TIRE HOLDER.

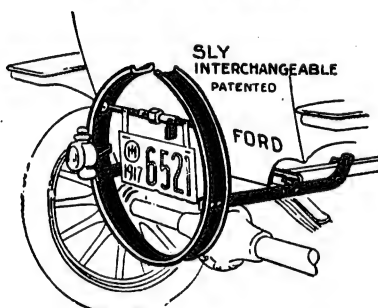
Second perhaps only to the number of cars stolen are the number of tires taken from machines without the owner's consent. A tire strapped on the running board offers an easy mark for the thief, who has only to unbuckle one or two straps and run away with a tire that can be converted into cash very easily.

To prevent theft, as well as to offer a handy carrier for tires, the Sly Interchangeable Tire Holder has been designed for both Ford and Chevrolet tires. This device resembles a quick detachable rim and is bolted to the rear of the car. When the tire is in place an expanding device is turned, locking the tire upon the rim or holder. A padlock prevents the loosening of the expansion nut and prevents removal by an unauthorized person. On the holder are provided places for a number plate and a tail lamp.

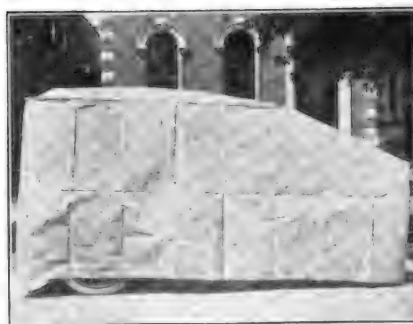
Manufactured by New Era Spring and Specialty Co., 1177 Hamilton Ave., Grand Rapids, Mich. Write for prices. Special terms to jobbers.



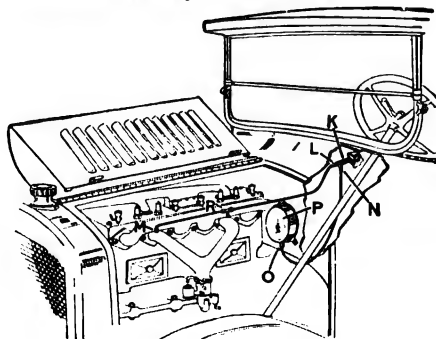
The Lydon Speedler.



Sly Tire Holder.



Kennedy Auto Cover.



Imperial Primer Attached.

KENNEDY AUTO COVERS.

Such cars as are to be stored this winter and left unused until spring, if unprotected, will collect dirt and dust, which, sooner or later, will penetrate the finish and impair the bright appearance of the body.

The Kennedy Auto Covers are made in a number of sizes of heavy durable paper, securely reinforced to prevent tearing and prevent the entrance of dust, dirt and, to a certain extent, moisture and light. They completely cover the car and make a private storage space in a public garage.

Manufactured by the Kennedy Car Liner and Bag Co., Shelbyville, Ind. Write for prices.

MOSCO CATALOGUE.

A new 1918 edition of the Mosco Catalogue is now ready for distribution to both the trade and car owners. The Mosco line, consisting of various devices for the Ford car, is very interesting and should be investigated by every person interested in Ford cars.

This line of goods consists of several types of timers, wheel pullers for various cars, valve grinders, auto locks, bow clamps and other Ford devices.

Write for catalogue to Motor Specialties Co., Waltham, Mass. Special dealers' proposition.

IMPERIAL PRIMER.

A device which is claimed by the manufacturers to do away with all starting troubles due to excessive and low temperatures, is known to the trade as the Imperial primer. This device is designed for practically any car and consists of an auxiliary or priming tank S, in which is carried a supply of high test gasoline, a priming pump K, which is connected with the manifold at one or more points.

One stroke of the pump plunger is said to force a finely atomized spray of fuel into the manifold, which furnishes the necessary vapor for the first two or three explosions; after which the engine is warmed enough to vaporize the fuel from the carburetor.

All tube connections are made by

means of compression couplings, so that soldering, flaring, etc., are eliminated. The only change required in the engine is the boring and tapping of the $\frac{1}{4}$ inch holes in the manifold.

Though the best results are obtained when high test gasoline is used in the priming tank, low test gasoline may be used with satisfactory results.

Manufactured by the Imperial Brass Manufacturing Co., 517 S. Racine Ave., Chicago, Ill. Price complete, \$6.

YANKEE VISE.

Every repair man or owner of a small garage doing his own repair work knows a bench vise is as essential as a hammer or wrench. A vise that should be of interest because of its varied uses, is known as the Yankee No. 1993.

This device consists of a cast iron body fitted with a sliding jaw, also of cast iron, which is carried back and forth by a $\frac{5}{8}$ inch steel screw. Both jaws are fitted with steel faces and the sliding jaw extends through a slot one inch wide in the body of the vise.

The device is mounted on a swivel base and may be removed for use on a drill press, shaper, or with other machine tools. It may be used for various kinds of work on the automobile. The space between the jaws when fully open is $3\frac{1}{4}$ inches.

With the vise is furnished a steel plate which has a number of V grooves for holding round or irregular shaped pieces.

Manufactured by North Bros. Mfg. Co., Philadelphia, Pa. Write for price and catalogue.

NOBLE SAFETY BRAKE.

Until a driver has been on the verge of an accident he does not know just how quickly his brain can act and how soon he can get control of his car. As a general rule an excited driver will grab for his emergency brake and if the brake is efficient he may avert an accident.

For the purpose of adding to the efficiency of the emergency brake of the Ford car, the Noble Safety Brake device has been manufactured. This device is so arranged that upon application of the emergency the service brake is automatically applied. The driver's attention need not be divided between the service and emergency brakes, but concentrated on the emergency lever at all times.

The manufacturers of this device claim that the braking action where equally distributed between the wheels and transmission is smooth and easy and that maximum braking efficiency is attained.

Manufactured by Hughes Manufacturing Co., 1806 South Michigan Ave., Chicago, Ill. Price, \$2.25.



Hot Pin Manifold.



Yankee Vise.



ROCK-A-BYE AUTO SEAT.

A unique contrivance, known as the Rock-A-Bye Auto Seat, is being marketed, which is designed to increase the comfort of the "smallest passenger" in the automobile.

This device consists of a brown washable duck basket, mounted on an enameled steel frame, the basket containing two holes through which the baby's legs protrude.

Two small steel cleats, three inches long, are furnished with the outfit, which can be permanently attached in a few minutes on any automobile to the back of the front seat, in which the hooks of the seat are engaged and sustained. All of the parts that come in contact with the polished surface of the seat are protected with soft rubber bumpers to prevent the marring of the surface.

The device is easily and quickly at-



Noble Safety Brake.

tached or detached, and when not in use folds up and fits under the seat. It is said to be absolutely safe and is strongly constructed.

Manufactured by the Perfection Manufacturing Co., 2700 N. Leffingwell Ave., St. Louis, Mo. Write for prices.

HOT PIN MANIFOLD.

The difference between wet and dry mixtures in the carbureting system is noticeable from their effects upon engine efficiency. Wet mixtures burn slowly, give less power, carbonize quickly and dilute the lubricant. The more thoroughly mixtures are heated the more finely they are vaporized, so that the evident solution to the fuel problem is the application of heat.

The Hot Pin Manifold, designed for Ford cars, consists of a double manifold or one manifold (the intake) cast inside of the other (the exhaust). With this arrangement all exhaust gases must pass over the surface of the intake manifold, heating the gas and reducing it to a dry vapor.

Inside the intake manifold are cast a number of pins, which absorb heat from the exhaust gases and transfer it to the incoming mixture, which passes around the pins on its way to the engine.

The whole device is installed in place of the two manifolds on the car, and may be installed even easier than the stock manifolds.

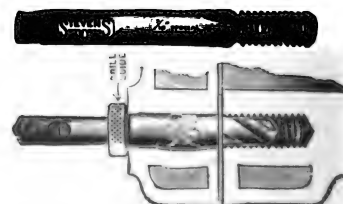
Manufactured by K. B. C. Co., 2015-A Michigan Ave., Chicago, Ill. Price, \$15.

CYLINDER TAP AND DRILL SET.

For maximum efficiency and satisfaction it is necessary that all of the Ford cylinder head screws are in place or the head will be apt to work loose and allow both gas and water leakage. Sometimes in removing these screws, which frequently rust into place, the body is broken near the block and the removal of the piece in the block is a difficult matter.

The No. 100 cylinder tap and drill set is designed to minimize trouble in removing broken pieces, and consists of a drill, a tap and a bushing, which fits the hole in the cylinder head. To use the set the bushing is put into place in the head and, with this as a centre the broken part of the screw is drilled. The drill is of such a size that all of the screw body except the threads is removed and the balance is removed with the tap, leaving a tapped hole taking a screw the same size as originally.

Manufactured by Stevens & Co., 375 Broadway, New York. Price, \$1.



Cylinder Tap and Drill Set.

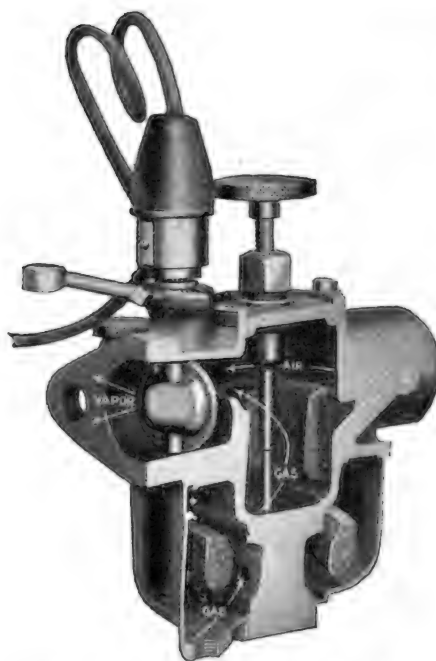
FORD WORM STEERING GEAR.

Many accidents are caused by failure of the steering gear, or because of the fact that the front wheels do not respond to the action of the steering wheel. For this reason many high class automobiles are fitted with irreversible worm steering gears, a type of steering gear which has been favorably received by engineers. The Ford car is not fitted with this type, however, and to satisfy those desiring a worm and wheel type the Sprague Irreversible Worm Steering Gear has been put on the market.

This device, similar in construction to the standard types, is so designed that it may be applied to Ford cars with but little change in the car itself beyond the removal of the old brace at the lower end of the steering column.

The Sprague gear is bolted to the engine and strongly made. Ample latitude for adjustment is allowed and the manufacturers claim to return the purchase money in case of dissatisfaction.

Manufactured by E. H. Sprague Manufacturing Co., Omaha, Neb. Write for price.



Electrically Heated Throttle Valve.

THERMOSTATIC METAL.

The development of G-E Thermostatic Metal by the General Electric Co. has put a new means for accurate control of cooling and electrical systems into the hands of automobile and accessory manufacturers.

This metal, which consists of two strong, non-corrosive units, possessing a wide difference in coefficients of expansion, yet firmly attached to each other throughout, is so susceptible to temperature changes that a difference of one degree higher or lower is said to tend to curve or straighten always to the same extent. It may be used for temperatures as high as 500 degrees Fahrenheit.

Thermostatic Metal can be cut, stamped or pressed into practically any desired shape, and when annealed will have all its original inherent qualities. The manufacturers claim that it will not deteriorate nor take permanent set under applications of heat or force within definite practical limits. It is manufactured in various standard thicknesses ranging from .25 to .015 of an inch, maximum width of six inches and maximum length of 36 inches.



Essensee Lock for the Ford Car.

Experiments indicate that a four-inch strip, 5/16 of an inch wide by .030 of an inch in thickness has a deflection of approximately .75 of an inch when heated from 76 to 212 degrees Fahrenheit, and exerts a force of about two ounces when subjected to a change of 100 degrees.

For particulars and charts write to General Electric Co., Schenectady, N. Y.

ESSANSEE LOCK.

A simple little device designed to make the locking of a Ford car a practical matter is illustrated herewith, and called the Essensee Lock. This device consists of an S shaped steel fitting, which is placed around the high speed clutch pedal and against the reverse pedal, holding the reverse and high gears in and making the removal of the car practically impossible. The device is locked into place back of the emergency brake lever.

It is said that the device is as strongly made as are the pedals, so that even if a crow bar were used to pry the device from its place the pedals would be broken before the device itself.

Manufactured by Essensee Lock Co., Land Title Bldg., Philadelphia, Pa. Write for prices.

CELLBEAM CONCEALED SPOT LAMP.

The Cellbeam Concealed Spot Lamp is a radical departure from conventional types of spot lamps in that instead of being used clamped to the windshield it is carried in the hand.

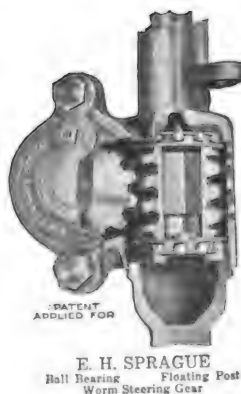
The device projects a concentrated beam which extends 500 feet in a straight line and a diffused glow which illumines near by objects at a greater angle. It is fitted with a six-volt nitrogen bulb and silvered reflectors. The exterior is finished in polished nickel and the handle is fitted with a focusing adjustment.

With the device is furnished five feet of flexible cord, which is connected with the battery in the usual manner, making an excellent "trouble lamp." The size is so small that it may be carried in one of the door pockets.

Manufactured by Cellbeam Manufacturing Co., 1101 Bedford Ave., Brooklyn, N. Y. Price, \$8.



Cellbeam Concealed Spot Lamp.

E. H. SPRAGUE
Ball Bearing Floating Post
Worm Steering Gear

ROAD CONDITIONS IN THE SOUTH

Roads Between Roanoke and Staunton Are Not Now What They Should Be

By F. H. LABAUME.

Agricultural and Industrial Agent, Norfolk & Western Railway, Roanoke, Va.

HAVE just returned from a 250-mile auto trip to Harrisonburg and Grottoes, Va., and I am not at all surprised that the American Automobile Association has advised tourists against attempting this route to Roanoke and on South through Martinsville and Winston-Salem.

While the road from Roanoke south is almost impassable during the winter season, the road from Roanoke north, with the exception of some eight or 10 miles to Cloverdale, a small stretch at Natural bridge and some 20 miles from Staunton to Harrisonburg and Grottoes, is also very bad. The dirt road between Cloverdale and Natural bridge is exceedingly rough, full of stones and bad holes. The roads in and out of Lexington are fairly good, but even the so-called improved toll gate roads are not to be compared with many free roads in the North.

Another thing that is exceedingly discouraging to tourists is the lack of proper road signs at intersecting points, and this is particularly noticeable to one accustomed to traveling overland in other sections.

With the exception of the main valley pike the trip is a hard one, and the condition of the roads with lack of other adequate facilities is going to prevent any development of tourist traffic until these conditions are remedied. With the wonderful scenic environment it is inconceivable that as little progress has been made in road improvement south from Staunton to Winston-Salem as confronts us today. There seems to be no good excuse for this lack of development, because local conditions do not warrant it. Our people as a rule are infinitely more prosperous than people in

many sections of Florida, North Carolina and other states where high class automobile highways have been so universally constructed in recent years.

I am convinced that 95% of the people who take the trip south through the valley and on south through Roanoke to Winston-Salem will be so thoroughly disgusted with the road conditions they encounter that they will never come this way again, and worse than this, they will advise all of their friends to keep out of this section. We residents of this entire territory are losing a great opportunity in not getting together and providing road facilities that will invite tourists and newcomers down here to see what abundant resources we have. We seem to think our roads are good enough because we do not realize how infinitely superior other roads in other sections of the United States are to our own. The bulk of our Virginia roads are mere cow paths compared with the highly improved roads prevailing in other states all about us. We are back numbers when it comes to public highways and the sooner we find it out the better it will be for us.

EDWARD V. HARTFORD
SEES BUYING MARKET.

"The war industries board in Washington is handling the material situation so capably that a feeling of optimism prevails in the motor car manufacturing industry, that bright present and future prospects may be expected," said Edward V. Hartford, president of Edward V. Hartford, Inc. "If motor car production is restricted war munition production will be greatly stimulated. The au-

tomobile industry in either case will be able to employ its physical equipment to profit. The distribution of all raw material is controlled by the war industries board. Just four companies are engaged in the production of alloy steel for motor car manufacturers who are consumers of only five per cent. of the total output. The government will make every effort to aid and foster our fourth greatest national industry. An advance in prices all round may be looked forward to and now is the time to buy."

GEORGE K. SELLECK WITH
STANDARD TIRE & RUBBER CO.

George K. Selleck, for the past two years with the Firestone Tire and Rubber Co., handling branch and jobbers' sales on rims and wheels, has been appointed manager of the wheel and rim department of the Standard Tire and Rubber Co. of Boston, Mass., and will look after that branch of the business throughout New England.

Mr. Selleck has been identified with the rim and wheel business for the past six years, during which time he has handled all makes and types of rims and his experience has made him an authority in his field. His new line will include parts and complete sets of all makes and types and sizes of rims and wheels.

LOUIS DE F. MUNGER GETS
DECISION IN RIM SUIT.

United States District Judge Manton of the Southern District of New York has handed down a decision in the case of Louis de F. Munger against the Perlman Rim Corporation, which establishes the plaintiff's ownership of the famous Munger patents, said to be the basic ones in the manufacture of demountable rims for motor car wheels.

This decision is interpreted as meaning that Munger is given right to collect royalties from the Perlman company for rims manufactured in the infringement of his patents, and also is in a position to take legal steps for recovery of royalties from any and all persons manufacturing the rim, infringing his patent.

NATIONAL AUTOMOBILE DEALERS
WILL MEET DURING N. Y. SHOW.

The board of directors of the National Automobile Dealers' Association will hold a meeting in New York during the National Automobile Show week in that city and will meet with the vice presidents of the eastern states.

OWNER INDICTED WITH
CHAUFFEUR IN DELAWARE.

The owner of a car who was riding in it when his chauffeur ran down and killed a child last September, has been indicted by the grand jury together with the driver. The case will come up for trial next January in the Delaware courts.



Gasoline Filling and Supplies Station of the Boston Oil and Gasoline Co., at Berkeley and Stuart Streets, Boston, Mass.

Sedan Models Disclosed with Pilot 6-45

THE Pilot Motor Car Co., Richmond, Ind., has announced a six 45 demountable sedan and coupe, both models being well suited for winter months. The series is well into its third season and its success is due to the same predominating features of comfort and performance which has characterized the line beginning with the first Pilot car built nine years ago.

These new models are a special offering in the sense that they are produced with the idea of being equally serviceable in warmer weather, as the tops may be removed entirely, if desired, and touring tops substituted. All four doors may be used. The glass side panels are removable by themselves. It is to be said for this model that the combination of the top and the standard body gives a solid, unified appearing car. The interior of the top is trimmed with a distinctive motor cloth, while the trimmings of the seat cushions and backs are genuine black leather.

Both styles sell at \$1520. For those who have Pilot cars already in service either top may be purchased separately for \$250.

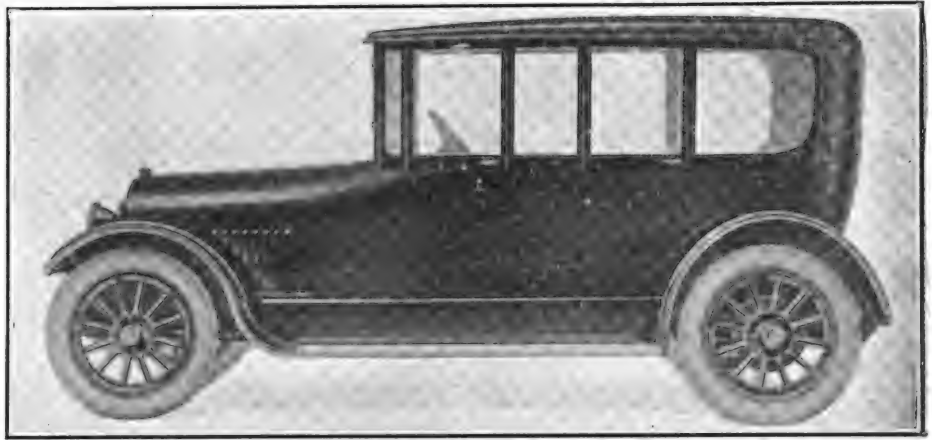
The Pilot power plant is a 45 horsepower, six-cylinder motor. It is 20x3½ inch bore, five-inch stroke. The engine is L head, cast in block. Transmission is a selective sliding gear, three speeds forward and reverse. Nicked steel gears and shafts are enclosed in the case with the engine and clutch forming the unit power plant. Chassis members are selected press steel frame, heat treated and hot riveted. A triangle torsion rod is used. The forward end is fitted with double spring buffers and ball and socket joints.

The front axle is of the I beam type and the rear axle is the full floating type. They have spiral bevel gears. The steel shafts are vanadium and the drive shafts are removable. Half elliptic 36-inch springs are used in front, while the rear springs are 52-inch cantilever.

Car control is on the left side. The steering gear is of the irreversible worm and sector type, and the unit is fitted with a polished walnut steering wheel. Lubrication is by splash system. The gasoline system is the Stewart vacuum feed and the Pilot carburetor is hot air jacketed.

FORD MADE 3000 CARS IN A SINGLE DAY.

The Ford Motor Co. of Detroit, manufactured 3000 Ford cars on Nov. 20, the highest daily production ever attained by that company. The company's production for November was very large.



Pilot Six Forty-Five Five-Passenger Demountable Sedan, Glass Enclosed for Winter Use.

KANT-MISS SPARK PLUG COMPANY IS ORGANIZED.

The Kant-Miss Spark Plug Co. has been organized in Green Bay, Mich., with a capital of \$10,000 to manufacture automobile supplies and accessories. The incorporators are William C. Haslem, Bearl E. Calburn and Jack Gilleaume.

NEW CALIFORNIA OIL FIELD.

A new oil field known as the Montebello field has been opened near Los Angeles, Cal., and it is believed it will be productive over an area of 2000 acres. A well driven by the Standard Oil Co. is producing about 7000 barrels a day of 24 gravity crude. This well is 3800 feet deep.

MOTORCYCLE CONSOLIDATION.

The Henderson Motorcycle Co. of Detroit and the Excelsior Manufacturing and Supply Co. of Chicago, both makers of motorcycles, have consolidated

through an exchange of stock and the manufacturing operations of the two companies will be conducted at the new plant of the Excelsior company in Chicago.

LEWIS FOUNDRY IS NOW LEWIS STEEL PRODUCTS CO.

The Lewis Foundry Co., Toledo, O., has been reincorporated as the Lewis Steel Products Co. with a capital of \$100,000. The company is now employing about 200 hands and is manufacturing 10,000 to 15,000 gas and gasoline engine valves per day.

HEARNE WINS LIBERTY SWEEPSTAKES AT ASCOT.

Eddie Hearne won the 50-mile Liberty Sweepstakes at Ascot Park, Los Angeles, Cal., on Nov. 29, covering the distance in 41.54.4, a new world's record for a one-mile course. Milton came in second, Louis Chevrolet third and Bolden fourth.

A. A. A. SUSPENDS ALL CONTESTS

No Racing Decision for the Period of the War Indorsed by President Wilson

THE Contest Board of the American Automobile Association, which controls practically all the major racing contests in America, has suspended the racing rules of the board under which all sanctioned meets must be held for the period of the war. This action, which has been indorsed by President Wilson, means that no contests of any kind or nature will be sanctioned for the period of war exigency, but that those already sanctioned can be held.

In the resolution passed through which action was taken reasons were given why the holding of contests was looked upon as detrimental to the best interests of the country at this time. The resolution was as follows:

WHEREAS, The country is in a state of war in which our entire available manpower is needed for national activities;

WHEREAS, The national need for mechanics, automobile drivers and others skilled in the care and maintenance of motor apparatus, that is playing such a leading role in the present war, is imperative; be it therefore

RESOLVED, That it is the sense of the Contest Board of the American Automobile Association that it will not sanction motor car contests during the period of war exigency and that during the aforesaid period the rules of the contest board shall be suspended.

Owners of the various big speedways throughout the country are in full accord with the board's action. The contest board will not disband, but will continue with its headquarters, 501 Fifth avenue, which have been in charge of Richard Kennerdell, the chairman, for a number of years.

Attractive Displays as an Aid to Winter Business

Parts and Accessories Furnish Material For Exhibits in Shops and Windows and Stimulate a Sales Campaign

STRONG use of display selling methods is helping the Fall and Winter campaign for merchandise sales connected with automobiles, automobile parts and automobile accessories. There is a great variety possible in this

showing business sagacity and the patriotism that will count heavily in winning the war.

The instances of window display selected have an appeal to them to stimulate the growing interest that motorists take in the parts and accessories belonging to their car.

For instance, the Bearings Service Co. has found that their displays cause motorists to come into their branches to inquire about the bearings in their cars, and the care which should be given them to keep them in working order. This company recently celebrated the anniversary of the first year of its operation and the display it made at its many branches throughout the country represented a birthday dinner party,

prominent feature of the recent N. C. R. salesmen's wives convention. Pageantry was called into use to convey selling ideas on figures that were arranged all around the convention hall. Demonstration is only another word for display, or "showing the goods," and while these usually include motions, they have the same function as a display or a stage setting in arousing interest even when there is no accompaniment of motions. The setting of the stage at the wives' convention for the department store demonstration, as shown in the illustration, embodies all the best principles of display.

The accessory dealer has at his command a wealth of material to make up attractive window displays and the campaign for Winter business will be much benefited by recourse to this method of expressing the store's individuality and thereby attracting trade. Motorists generally appreciate that in effect a display is an actual service to them.

F. H. CLARKE SENTENCED IN KENT MOTORS CASE.

Frederick H. Clarke, president of the Kent Motors Corporation, was sentenced to three years in the Federal prison at Atlanta and fined \$2500 by Judge Davis in the Newark branch of the United States District Court. He was recently found guilty of using the mails to defraud in marketing the stock of the Kent Motors Corporation, which was declared bankrupt. His father, Dr. Henry F. Clarke, treasurer of the company, who was also found guilty, was fined \$2500, but escaped a prison penalty on account of his age, he being nearly 80 years old. Frederick J. Nagle was sentenced to a year and a day and John A. Simpson was fined \$2500 for fraudulent flotation of the same stock.



The Birthday Banquet—A Novel Window Display by the Bearings Service Company.

field of advertising right on the spot where the goods are sold, and manufacturers make a point of dealer helps in displays for sales which it is worth the while of progressive dealers to get in touch with.

The National Association of Accessory Jobbers in its dealer help announcement recently made its first point on campaigning for Winter business. It made another point on displays of goods in connection with this campaign and succeeding campaigns. It makes another point that the program after the Christmas holidays will be in the nature of a paint up, clean up and brighten up campaign.

What we have here presented on this page is interesting applications of display in the motor and accessory trade. Not all of them are window displays. Show room display and convention hall display are selected with the aim of reminding the trade that intensive business campaigns are what are going to win the battle against the tendency of business to lag during the war. There is a supreme fight necessary to hold up the hands of the fighters who have gone out to battle for making democracy safe. One of the first moves necessary is to stick to business, and stick to it hard and strong.

It is never going to help to stick away goods on the back shelf. Get them out front where the great buying public, well supplied with means, will buy them. Display! Show your goods. That will be

a table being set in birthday fashion, with candles, place cards, wine glasses, ribbons, flags, a large birthday cake and all the other customary trimmings for such an occasion. Twenty-two plates were set to symbolize the number of branches of the company now in operation. In all the displays bearings played a prominent part, Timken bearings being built up to form candle sticks, Hyatt outer races being used for napkin rings and New Departure bearings acting as supports for the place cards. The central idea was not to glorify the deeds of the company; it was to appeal to the onlooker and to arouse his desire. The appeal to physical hunger is strong, and its application in this excellent display is at once apparent. The drawing power of a feast fixed attention on the goods used as decorative features. No wonder onlookers are impressed and customers attracted into the store. No mistake of setting printed cards and price tags everywhere was made in this tasty display. A simple card just announced "A Year Ago—A Trade-mark and an Idea." Display was a



Department Store Demonstration, or Living Picture Display, at the N. C. R. Wives' Convention.



The New York National Automobile Show will be the first war time show. At the time of the Spanish-American war the gasoline car was undeveloped. Motorism will be unusually interested in the exhibitions coming this year through their patriotic flavor, as well as their lessons in the essentiality of the motor car.

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All motorists in the State of Montana will be required to secure their 1918 plates in December and have them attached to their cars on the first day of the new year or they will be liable to arrest. Over 40,000 new plates have been ordered. The letters are white on a blue background.

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One of Boston's constituent towns has put on the list for police attention small boys who will persist in hanging on automobiles and motor trucks. Heretofore Bub has had things pretty much his own way in the matter of uninvited rides. The



police have orders to arrest such daring youngsters after this.

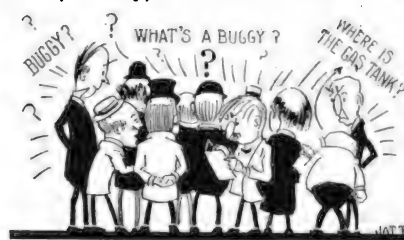
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Boston has a new taxi cab company which made itself popular in the field by starting off with reduced fares as compared with those that prevailed before. The cut in charges ranges from 25 to 50 per cent. One person may ride one mile for 45 cents as compared with 60 cents under the old schedule, and the charge for additional passengers will be 10 cents each instead of 20. The "Town Taxi, Inc.," which operates the new 'buges, has posted the following tariffs: "First one-third mile or fraction, 25 cents; each one-third mile thereafter, 10 cents; each six minutes waiting, 10 cents; each passenger in excess of one, 10 cents; sending car each mile or fraction in excess of one mile, 20 cents; return mileage, each mile or fraction over two miles, 20 cents; trunks, 20 cents each, carried only by arrangement."

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Changes wrought by time are slow but miraculous in many respects as indicating a revolution of attitude and opinion in the mind of man. It was not long

ago when a motor car at an exhibition was the cynosure of all eyes, while the ordinary buggy would attract little attention, if any, no matter where it was



seen. The buggy now is such a rare sight to the average city man that he is obliged to stop and think before he can visualize it. A striking illustration of this change that time has wrought was presented at a big industrial exhibition in one of the western cities where a lone buggy amid a setting of cars, tractors and farm implements was the object of as much curiosity almost as its self-moving successor was 18 years ago.

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The motor car as a relief vehicle proved its essentiality and dependability in the disaster which descended on Halifax. Not a car of the street railways system was movable.

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The fame of the British tank has by this time penetrated to every corner of the earth, but it is doubtful if the average person comprehends the tremendous power of these machines and their ponderous appearance. One of the machines that was exhibited in New York was taken to Montreal and during the demonstration there was driven over an old touring car to show its almost irresistible force. Needless to say after it had floundered over the automobile the latter was serviceable only to a junk man and as flat as the proverbial pan cake. The demonstration was witnessed by thousands of people and was filmed for the movies.

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Some one has said that the automobile is a vehicle which combines the



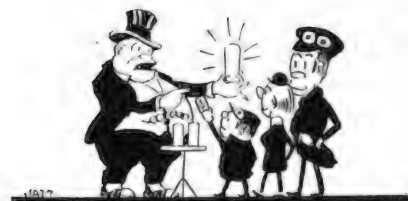
poetry of motion with the soul of art. Until the gasoline car took the limelight away from the steam locomotive the latter held something of the same distinction. Some odd inspiration has caused A. F. Sternad, a western designing engineer, to bring the rivals into a combination, and he has spent \$10,000 building a hybrid which looks and makes noises like a locomotive, but has the family habits of an automobile. Five hundred pounds of aluminum were used in its making. There are air brakes, an air operated whistle, a regular bell and other locomotive accessories, yet the contraption has proved itself capable of making 60 miles an hour or better.

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Don't forget the smokes for the soldiers. A sergeant says the tobacco solace gives the boys over there not a few pipe dreams about the good old U. S. A.

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He toils not, neither does he spin, is



an axiom applicable to many people even in this day when the cry is "do your bit." Some live by brawn and some by wit, but those who gain substance through the latter means usually encroach closely upon the realm of crime without realizing it. The ways of the easy money man and faker, however, are so ingenious at times that they compel attention, as in the case recently with a man in Bridgeport, Conn., who was building up a flourishing business in light regulators for Ford cars made up of a nicely painted tin can with several wires connected thereto, before it was discovered that the contents consisted of water soaked newspaper clippings. Many credulous purchasers of these devices did not see the light until there was none, although the inventor claimed that the use of his regulator would keep the lights up when the engine was stopped.

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A protest against placing the burden of fuel economy on the motorist is at once timely and refreshing. When a prominent engineer rises to remark that saving of dribblings by individuals in their car operation is conserving only

the proverbial drop in the bucket, it is extremely comforting. The old adage of "saving at the spigot and wasting at the bung-hole" inevitably comes to mind. By all means the "bit" belongs as much to the engineer and designer as to the individual motorist. They are the factors to regulate engine efficiency and split gasoline so that it will do threefold work or more. More papers like that of Engineer Deppe before the S. A. E. and the work following is the Edison path toward real conservation.

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Returning from the West Side, where he had just delivered her first car to a woman who had insisted on a multitude of particularities, the salesman was indulging royal dreams over the spending of his commission when the telephone bell rang. It was the buyer saying wrathfully, "Didn't you sell me this machine with the understanding that it was a self-starter?" "Yes, and it is." "How dare you contradict a lady, sir. I must push a button to make it go."

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The Minneapolis Automobile Trade Association is organizing a motor reserve throughout the State of Minnesota which stands ready to respond to a call for service in transporting representatives of any branch of the government on war



duty. R. B. Simning, assistant secretary of the association, is organizing the reserve and has picked a dealer in each city who is called upon to enroll at least 10 members in the reserve. The "Motor Reserve" as it is called, has notified the War Department that it stands ready to do its bit and has received a letter from Secretary of War Baker expressing his appreciation of their offer "of the very helpful and cooperative scheme."

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Motor car thieves are continually devising new methods of hiding or disposing of their booty so that they will escape the clutches of the law. New York policemen discovered a car completely disassembled in that city in an old barn and after identifying it as one stolen from a New York dealer, the men who were arrested on the premises admitted their guilt and said they could get as much for the car by selling it piece meal as if disposed of complete and would not run near as great risk of becoming apprehended.

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The old story of the artist who painted the plants so realistically that the servant watered them daily, loses its savor in face of the latest artistic genius, whose wonderful talent for landscapes might still be unknown like the "rose that was born to blush unseen and waste

its fragrance on the desert air," had not her father called attention to it. He was on an automobile tour in the West and while witnessing a gorgeous sunset in the sky just streaked with lights that reminded one of the glories of the auro-



ra, was inspired to say: "It certainly is a mighty colorful sunset—certainly is—but you ought to see the one my daughter painted."

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In the list of members of the "Ananias Clubs" which the National Committee of Patriotic Societies proposes to form, motor vehicle manufacturers expect to see the names of the following:

The man who started the rumor that no gasoline will be available for motor cars.

The man who advised the world that the government is going to stop the production of motor cars; also the man who started the rumor that the government already has stopped motor car manufacture.

The man responsible for the statement that the government will not permit the sale of steel to motor car companies.

The man who invented the tale that all skilled automobile workers have been demanded by the government to be used on government work exclusively.

The man who declared that within a short time it will be impossible to purchase tires.

H. H. Hills, assistant general manager of the Packard Motor Car Co., declares that such rumors are vicious propaganda and all loyal Americans should do all they can to counteract these false stories.

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While the women drivers of Massachusetts constitute about eight per cent. of the licensed motor operators of the state, they were only involved in four per cent. of all the accidents, according to the highway commission report just issued. The women are apparently more careful in Massachusetts and more efficient. There are 11,000 women drivers in the state.

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When the women of New York state



went over the top and captured the vote they established a precedent that may greatly extend their scope of activities in other ways in the affairs of men. At

least this is the opinion of the governors of the Long Island Automobile Club, the oldest in the United States. When the notices were sent out for the annual meeting the members were surprised to note that their wives, sisters and sweethearts were invited, which marked the fall of an old precedent, as never before were the fair sex so honored as to be permitted to listen to the pearls of wisdom from the men folks at their annual pow wows.

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A "motor messenger service" of men and automobiles is being organized by the Automobile Club of Philadelphia, which will be at the disposal of persons and agencies engaged in the entertainment of enlisted men. The cars of those who enlist will be given for transportation of men and women who take part in entertainments for soldiers and sailors at the Philadelphia Navy Yard, Camp Dix and Wrightstown, N. J.

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Art as it exemplifies itself in the automobile body design has developed curious and wonderful creations, but none so striking and original as that conceived by Charles Kellogg, a naturalist. While his finished job would claim most of its artistic merit through its rugged simplic-



ity, his material and methods inspires awe and wonder. Kellogg went into one of the great red wood forests in California and after selecting a huge tree several hundred feet long and 11 feet thick at the butt, set to work hollowing it out and fashioning it into an artistic body providing sleeping and living quarters while enroute. His Nash Quad, which he purchased before starting work on the body, stood him in good stead, as he used it as a hammer and to manipulate the huge chisel which was specially constructed to excavate the interior of the log. When completed the job attracted such wide attention, a New York motor car dealer, hearing of it, went to California and brought it to Broadway, where it is one of the sights along the Great White Way.

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The various motor schools are doing a valiant service for Uncle Sam. Every day boys in the uniform of Uncle Sam drop into the schools or write, the Michigan school reports, saying they had no difficulty in receiving just the kind of work they like. The army needs competent mechanics and the motor industry is furnishing thousands of them, because the motor service is the main stay of the army in regard to equipment and movement.

CHECKS TWO-CENT FUEL INVENTOR

Court Restrains Louis Enricht From Giving Out Famous Formula For the Automobile Engine

LOUIS ENRICHT, the German inventor, who gained considerable fame early in the year as the inventor of a substitute for gasoline which could be manufactured for two cents a gallon, has been restrained from disposing of his product and from giving out information regarding it. This order was secured from Supreme Court Justice Manning in New York on the application of the National Motorpower Company, Inc., a Delaware corporation, which was represented by B. F. Yoakum. It is alleged in the bill of particulars that prior to the entrance of America into the war Enricht proposed to sell his secret to Germany for \$1,500,000, and that on Nov. 12 he agreed to let it be sold to the United States government for \$500,000 cash and \$5,000,000 a year for 15 years on condition that none of America's allies in the war should share in the secret. Further allegations are: "On a date unknown to the plaintiff Enricht fraudulently and traitorously entered into an agreement with the German government through spies and representatives in the United States, under which agreement, for a large sum of money, Enricht agreed to withhold from the plaintiff, 'who intended the formula for the United States,' all information of this ingredient until the expiration of the war."

The Automobile Club of America has been officially represented during tests of Enricht's fuel, which is said to be largely water, made explosive by the addition of a chemical, the formula for which is said to be in a vault at the First National Bank at Farmingdale, L. I.

Following the filing of the suit, Enricht, who is 70 years old and native of Germany, denies that he had any dealings with spies.

Several days later announcement was made in St. Louis by J. V. Nevin that he had discovered a chemical formula which in combination with 128 parts of water has the qualifications of gasoline and can be manufactured for about five cents a gallon. This formula is thought to be similar to that of Enricht's. According to Nevin, who is treasurer and director of the Nevin Chemical Co. of St. Louis, gasoline has 13 per cent. of hydrogen and three per cent. of ethylene, while his substitute carries 16 per cent. of hydrogen and six per cent. of ethylene gas. The fuel has a greenish hue, in which respect it is similar to Enricht's fuel.

Nevin is a native of Ireland and came to this country about 10 years ago. He was a resident of California before coming to St. Louis two years ago. "I am convinced it is a more efficient fuel," says Nevin, "than gasoline itself. The

chemicals used are taken from minerals to be found in abundance in the United States. The chemical can be produced in five minutes, while its mixture then instantaneously produces the gasoline substitute."

"I am an American citizen and the United States government is welcome to my formula through any proper authorities," said Nevin. I would be perfectly willing to reveal the formula publicly except for the fact that by doing so it would furnish it to the German government, and in my judgment such things should be kept from the enemy."

Affidavits filed in the case against Enricht tend to substantiate his claims as to the practicability of his fuel. Claude Goodman Johnson, at one time secretary of the Royal Automobile Club of Great Britain and Ireland; W. S. Pierce, a chemist, and J. S. Critchley, chief inspector of the mechanical transport of the Army Service Corps of England; F. A. St. W. Bedbrook, deputy director of inspection of the British Ministry of Munitions of War in the United States, and Benjamin F. Yoakum, director of the National Motor Power Co., made affidavits that they had witnessed tests of the Enricht fuel, which were successful. It was claimed by each that Enricht put 2½ ounces of chemicals into 2½ gallons of water, adding ½ ounce of green fluid, making a fuel on which three automobiles ran successfully.

In the affidavit filed by Mr. Yoakum, he claimed that Enricht admitted withholding one ingredient after agreeing to turn over the complete formula and that the inventor's reason for doing this was that he did not want the fuel to be used against Germany.

The report that the formula was in the vaults of the First National Bank at Farmingdale, was denied by Enricht, who claims that the safe deposit box contains nothing but Liberty bonds.

MCLEAN SALES MANAGER OF STEGEMAN CO.

E. M. McLean, formerly advertising manager of the Four Wheel Drive Auto Co. and prior to that sales manager of the Armleder Co., has been appointed sales manager of the Stegeman Motor Car Co., Milwaukee, Wis., which has recently been taken over by a new managerial organization.

Oscar Stegeman has resigned as president and general manager and has been succeeded by Adam J. Mayer, treasurer of the Mayer Boot and Shoe Co. Lynn S. Pease has been elected secretary and treasurer to succeed L. G. Schertl, resigned. The company will continue the manufacture of six-cylinder trucks, but will confine the line to two, 3½ and five-ton capacities, eliminating the three, four and seven-ton sizes.

AMBOY ROAD OPEN.

The Amboy road, furnishing nine and one-half miles of the principal thoroughfare across Staten Island, has been rebuilt and was opened for traffic a few days ago. The work was accomplished within a year. This road is much used for the transportation of government supplies and munitions and is also one of the most important links in the route across Staten Island of the through route between New York and Long Branch, Philadelphia and Atlantic City.

HUDSON MOTOR CAR CO. ISSUES NEW PRICES.

The Hudson Motor Car Co. of Detroit has issued a new price schedule showing advances of from \$300 to \$475. The list is as follows: Seven-passenger phaeton, \$1950; four-passenger phaeton, \$2050; runabout landaulet, \$2350; four-door sedan, \$2750; touring limousine, \$3150; limousine, \$3400; limousine landaulet, \$3500; town car landaulet, \$3500; town car, \$3400; full folding landaulet, \$4252.

PATHFINDER MOTOR CAR CO. SOLD.

The Pathfinder Motor Car Co., Indianapolis, Ind., was disposed of at receiver's sale for \$59,100 to L. Goldstein Sons, Philadelphia, Pa.



Hudson Supersix Touring Limousine, a New Model for 1918, a Neat Job, Priced at \$3150.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration.

The Goodyear Tire and Rubber Co., Akron, O., is running a fleet of trucks on regular schedule over the Lincoln Highway between Akron and Boston, a distance of 1500 miles. The machines,

issue of preferred of \$100,000 remaining unchanged.

The Edison Storage Battery Co., West Orange, N. J., will increase its capital stock from \$3,500,000 to \$5,000,000. The

managers are as follows: J. W. Moore, Ft. Worth, Tex.; F. S. McNaul, Hutchinson, Kan.; W. J. Balaum, Waco, Tex.; F. T. Reuter, Oklahoma City; S. S. Clark, Salina, Kan.; W. F. Burbank, San Diego, Cal.

The United States Rubber Co. will do a business in tires of about \$55,000,000 for the current year, which is about 35 per cent. of the estimated gross total. The company has war orders totaling nearly \$5,000,000. Based on the earnings for the 11 months ending Nov. 30 it is estimated that the company will show a minimum net for the full year of \$15,000,000, allowing for a war tax of \$1,000,000.

Charles S. Shotwell has petitioned for a receiver for the Shotwell Pump and Tank Co., Indianapolis, Ind. He is a stockholder in the company and a member of the directorate. In his petition he claims that the company has liabilities of \$35,866 which it is unable to meet, and that the company's products are being sold at less than manufacturing costs.

The Ford Motor Co. has appealed to the state supreme court from the decision which Circuit Judge Hosmer of Detroit recently handed down in the Dodge-Ford suit ruling that the Ford company would have to disburse accumulated dividends of over \$19,000,000.

Willard S. French is the new director of sales of the Monarch Governor Co. of Detroit, Mich. He was previously in the organization of the C. S. Von Poettgen advertising agency and prior to that was advertising manager of the Denby Motor Truck Co.



Part of a Fleet of Motor Trucks Operated on a Regular Schedule Over the Lincoln Highway Between Akron, O., and Boston, Mass., a Distance of 1500 Miles, by the Goodyear Tire and Rubber Co., a War Time Development of Long Distance Haulage Within the Industry itself.

which run on Goodyear pneumatics bring tires to the eastern market and take back tire fabrics and other materials that enter into the manufacture of their products.

The Franklin Automobile Co., Syracuse, N. Y., which was operating on a production schedule of 242 cars a week, is now producing 294 weekly, or at the rate of 15,000 cars annually.

J. C. Matlack has been elected president of the Globe Rubber Tire Manufacturing Co., Trenton, N. J. He was formerly secretary and general manager of the Ajax Rubber Co., which position he resigned to become interested in the American Writing Paper Co. He will sever his connections with the writing paper company to devote his entire time to the tire business.

Graham Brothers, Evansville, Ind., are planning the manufacture of a two-ton truck attachment for converting passenger cars into commercial uses. It will be built along similar lines to the Ford attachment made by the company and will have a Torbensen axle. The price will be \$585.

The Weidely Motors Manufacturing Co., Indianapolis, Ind., has increased its capital stock to provide for the expansion of its manufacturing facilities, including the erection of a new plant which will triple its manufacturing space. The common stock has been increased to \$1,000,000 from \$600,000, the

certificate of increase filed with the secretary of State of New Jersey states that 20,000 shares of stock will be preferred of a par value of \$100 each and 30,000 shares are common stock of the same par value.

The Dodge Brothers Motor Corporation of Detroit will increase its capital stock from \$6,000,000 to \$10,000,000. This additional capital, it is understood, represents part of the outlay made by the company in enlarging and extending its plants.

The Mitchell Motors Co., Racine, Wis., has passed the quarterly dividend of \$1.50 as a means of conserving the company's cash to provide additional working capital for its increased production. In the fiscal year ending Oct. 31 last the company's profits are estimated to have been from \$1,100,000 to \$1,200,000 as compared with \$1,188,398 in 1916.

The Morgan Manufacturing Co., Inc., automobile parts and accessories, has moved from Newport, R. I., to Keene, N. H.

The B. F. Goodrich Rubber Co., Akron, O., have announced changes in the managementships of eight of its branches. T. B. Graham has been appointed manager at Seattle, Wash., to succeed C. J. Pomeroy, who has entered the service, and E. D. Yount succeeds W. W. Vandever as manager at South Bend, Ind. Mr. Vandever has been transferred to the Goodrich sales school. Other appointments of



Willard S. French, Sales Manager, Monarch Governor Co., Detroit, Mich.



J. C. Ayers, Vice President, Sales and Advertising Manager of the Denby Motor Truck Co., Detroit, Mich.

J. C. Ayers, now vice president of the Denby Motor Truck Co., Detroit, Mich., will have charge of sales and advertising. Mr. Ayers was formerly with the Rapid Motor Vehicle Co., and the General Motor's organization as a branch manager. Previous to going to his new position he was engaged as a distributor in Detroit in the Towars-Ayers company, which he helped organize and which made a record of a truck a day.

The Combined Motors Corporation has organized at Chicago as the parent company of a merger of the Bour-Davis Motor Car Co., the Dixie Motor Car Co., the Collins Body Co. and Shadburne Bros. The officers and directors of the company are: President, B. L. Craig, president of the Collins Body Co., which has a plant at St. Louis, Mo.; vice president, L. A. Shadburne; treasurer, H. P. Brown; assistant secretary, William Ewald; chairman of the executive committee, Alexander Hoyt. These officers and the following comprise the directorate: C. J. Bour of the Chicago, Duluth and Georgian Bay Transit Co.; F. D. Hartman, W. L. Shadburne and Elmer F. Adams. The Bour-Davis Motor Car Co., which has a plant at Detroit, Mich., manufactures the Bour-Davis car. Shadburne Bros., makers of the Shadwyck Six, have a plant in Chicago, and the Dixie Motor Car Co., makers of the Dixie Flyer, have a plant in St. Louis. The manufacture of these three cars will be continued and the plants developed so that the company will ultimately manufacture practically all the parts in their own factories.

The Martin Truck and Body Corporation, York, Pa., has delivered eight ambulances to the New York chapter of the Red Cross, specially constructed on the regular $\frac{3}{4}$ -ton Atlas truck chassis, 116-inch wheelbase, rear axle construction and Atlas motor. The locker plan is according to Red Cross specifications. Equipment includes electric self-starting and lighting devices and heavy wood artillery type wheels.

The Peerless Motor Co., Cleveland, O., is reported to have sold the Long Island City General Vehicle plant to the government for \$2,500,000.

Arthur H. Cummings, formerly assistant advertising manager of the B. F. Goodrich Co., Akron, O., has been appointed advertising manager of the Timken Roller Bearing Co., Canton, O.

The Milwaukee Forge and Machine Co., 220-224 Lake street, Milwaukee, Wis., has started work on a new plant to cost about \$65,000, and which will be ready early in the new year. The new plant will consist of a forge shop 75x135 feet and a machine shop 65x120 feet.

R. H. Daniels has been appointed export manager of the Goodyear Tire and Rubber Co., Akron, O., succeeding J. C. Mcfedyean, who resigned to enter business for himself.

The Mason Tire and Rubber Co., Kent, O., made net sales of over \$1,200,000 in the fiscal year, and net profits of \$181,504.36. After all charges a balance of \$104,330.22 went to the surplus account. The following directors were elected for the current year: O. M. Mason, D. N. Mason, R. W. MacKinnon, M. B. Mason, J. H. Diehl and D. M. Mason.

The Grant Motor Car Corporation, Cleveland, O., has announced a new price schedule for its 1918 models. The new list is as follows: Touring car, \$1055; roadster, \$1055; detachable sedan touring, \$1350; all weather sedan touring, \$1595; all weather sedan, \$1575.

The Saxon Motor Car Corporation, Detroit, Mich., has announced an increase of \$50 in the price of the Saxon four-cylinder roadster from \$395 to \$445, the new price to become effective Jan. 1.

The Marathon Tire and Rubber Co., Cuyahoga Falls, O., increased its sales 60 per cent. during September, October and November, as compared with the same period of the previous year. Orders on the books are 80 per cent. greater than at the same time in any previous year.

The Prest-O-Lite Co., Indianapolis, Ind., has announced the appointment of the following battery service stations: Leadville Garage, 816-818 Harrison avenue, Leadville, Col.; Overland Madison

Co., Madison street, Madison, Ga.; J. E. Valentine, 319 North Spruce street, Abilene, Kan.; Kerr Electric Shop, 721 Commercial street, Emporia, Kan.; Seaman Motor Car Co., Glen Cove, L. I., N. Y.; Myers Tire and Battery Co., 125 N. Main street, Miami, Okla.; Smethport Garage Co., Smethport, Pa.; Fremont Storage Battery Co., Cornelius Block, Arch and Front streets, Fremont, O.; B. A. Swenson, 522 Broad street, Providence, R. I.; Schlaper Hardware Co., 815-819 College avenue, Appleton, Wis.; the Battery Shop, Inc., Bellingham, Wash.; Moscow Tire and Battery Co., corner Main and Fifth streets, Moscow, Ida.; Prospect Storage Battery Service Co., 229 Prospect street, Cambridge, Mass.; Brondel & Lietzan Battery Service Co., Owosco, Mich.; McMorris Electric Co., 113 N. Fifth street, Henryetta, Okla.; Hardison & Arthur, Lewisburg, Tenn.; Jeager Tire Store, 410 N. Washington street, Lansing, Mich.; the Colgan Tire Co., Waycross, Ga.; Bangor Garage, Bangor, Mich.; Indiana Motor Car Co., 118 E. 33d street, Chicago, Ill.; the Electric Service Co., 10th and A streets, Ft. Smith, Ark.; the Awan-Bower Co., 530 Market street, Steubenville, O.; Blytheville Construction Co., Blytheville, Ark.; Hoyt's Car and Carburator Co., 3380 Washington street, Jamaica Plain, Mass.; Carolina Auto Co., 1400 Union street, Newberry, S. C.

The Air-O-Flex Automobile Corporation, Detroit, Mich., announces the engagement of Charles Lemkuhl as secretary to succeed G. L. Nadel, who retired owing to the pressure of other business. Mr. Lemkuhl was former credit man of the old E. R. Thomas Co. and of its successor, the Chalmers Motor Co.

The Silvex Co. has been reincorporated under the laws of Delaware with an authorized capital of \$2,000,000, half common and half preferred. The company will occupy a new factory at Bethlehem, Pa., which will make possible a considerable increase in the production schedule of Bethlehem spark plugs and other products. The directors of the company are: President, E. H. Schwab; J. H. Ward, E. B. Turn, W. M. Davidson and W. H. Lumpkin.



Fleet of Eight Ambulances Made for the Use of the New York Chapter of the Red Cross on Regular $\frac{3}{4}$ -Ton Atlas Truck Chassis with 116-Inch Wheelbase.

MOTOR INDUSTRY REQUIRES LITTLE ALLOY STEEL.

The general impression that the motor industry's requirements of alloy steel were so great that its use was handicapping the munitions work and therefore called for a curtailment in the production of cars seems to be groundless according to dispatches from Detroit, the automobile centre of the world.

It is said to require about 75 tons of alloy steel in manufacturing a thousand cars, but engineers claim this consumption can be cut to 23 tons per thousand cars without greatly diminishing their quality.

JEFFERSON ELECTRIC WARNING.

The Jefferson Electric Manufacturing Co., Chicago, Ill., is warning the trade against a man calling himself "R. A. Spencer," who has been representing himself as a salesman of the company among New England automobile supply houses. He secured some of the company's products through jobbers or other channels and has been disposing of them to dealers at about 100 per cent. higher than list price, the company informs this journal. The company sells its products only through jobbers and they have no traveling representatives by the name of Spencer. Neither do any of the representatives sell and deliver goods.

INTER-STATE CARS ADVANCED.

The Inter-State Motor Co., Muncie, Ind., announced a new price schedule on its cars which went into effect on Dec. 1. The new schedule is as follows: Five-passenger touring car, \$1000; two-passenger roadster, \$950; four-passenger roadster, \$1025.

PACKARD ADVERTISING MEN PLAN FOR DEALERS.

Branch advertising managers of the Packard Motor Car Co. from New York, Chicago, Cleveland, Philadelphia, Pittsburgh and other large centres recently held a convention at the factory in Detroit for the purpose of preparing an advertising campaign from the dealers' angle.

F. P. NEHRBAS MADE MANAGER.

F. P. Nehrbas, formerly production manager of the Premier Motor Corporation, Indianapolis, Ind., has been promoted to the position of general factory manager. Charles S. Crawford, associate chief engineer, has been made production manager.

PERLMAN SALES WILL BE HANDLED FROM JACKSON.

The Jackson Rim Co., Jackson, Mich., has been made the sales department of the Perlman Rim Corporation, also of Jackson, and hereafter the sales end of the Perlman Corporation will be handled from Jackson instead of New York City.

One Advertisement Eight Years Old Pulling Trade

Being the True Tale of a Fiji Islander's
Delayed Response to a Car
Announcement.

The power of advertising is generally thought of in terms of quick results and advertisers generally are not satisfied unless inquiries follow closely upon the appearance of their advertisement, but F. G. Clark, president of the Columbia Motor Truck and Trailer Co. of Pontiac, Mich., received a letter the other day which demonstrates that an advertisement may be effective after years have passed and that inquiries may then come from the most outlandish places on earth.

In this advertisement, which appeared in an automobile engine trade paper eight years ago, the Columbia Motor Truck and Trailer Co., then known as the Clark company of Lansing, Mich., proclaimed an 18 horsepower, water cooled, shaft drive motor car, which it has, of course, long ceased to manufacture.

The letter of inquiry is from Suva, Fiji Islands, and the inquirer says that if the catalogue shows the car to be what he wants, and if the first car is satisfactory, he will order others.

Even the trade paper in which the advertisement appeared is out of existence, despite the fact that its work goes on in an advertising way.

"One hears much of the fact that the printed work can never be as effective as the salesman's personal and ready appeal; that advertising is necessarily limited in its capacity to sell a possible prospect," says Mr. Clark. "This is true—so true that advertising does not try so much to sell, as to interest and cause the reader to inquire. But if advertising is limited in this way it more than makes up for its limitation by the duration of its appeal. The printed word endures and our children may possibly be sold on the advertisements which are being run in our papers of today."

AUTO COMPETITION FORCES RAILROAD TO SUSPEND.

A small railroad running out of Denver, Col., has filed notice with the public utilities commission of that state of its intention to go out of business owing to decrease in operating revenues resulting from the severe automobile competition.

R. E. INGERSOLL DEAD.

Ralph E. Ingersoll, vice president and general manager of the Reo Motor Co., Inc., of New York, died on Dec. 3, following an operation. He was one of the best known men in the automobile trade in New York. He was 42 years old and had been engaged in the motor car trade since 1905, when he opened a Reo branch

in Cleveland, O. The next year he was sent to New York, where he soon became vice president and general manager of the eastern Reo car agencies.

LOS ANGELES AUTO SHOW PROVED BIG SUCCESS.

The seventh annual automobile show of the Los Angeles, Cal., dealers proved a big success, as the business accomplished during the exhibition alone was nearly \$225,000. As there was no building in the city large enough for the exhibition, it was staged in the Billy Sunday tabernacle and three tents.

OPENS NEW SALES ROOM.

The Malbohm Motor Sales Co. opened its new sales rooms at 2637 Michigan avenue, Chicago, Ill., Dec. 3.

VALUE OF MARKING CARS AGAINST THEFT.

A car theft in Detroit recently, the subsequent investigation and the arrest and conviction of the thief has revealed a new way for car owners to identify their property, though it be in an almost unrecognizable condition. The method is simple. All that an owner need do is to put some small, distinguishing marks on several of the component parts.

The Detroit case came to light when the Detroit Automobile Club started an investigation after a Ford car owned by Lawrence D. White of Owosso, Mich., a club member, had been stolen while White made a five-minute call in a downtown office building.

After several weeks a certain place advertising used parts for Fords was investigated. There the body, radiator and other parts of White's car were found and identified. The police questioned the shop owner, who finally told where he bought the car.

It developed that a supposed junk dealer, Isadore Schwartz by name, sold the car for \$60. When arrested Schwartz said he had purchased the car on May 22 from a man who later joined the United States army. With sufficient evidence gathered by the police, Schwartz was held for trial in recorder's court.

At the trial the police produced George Wilson of Owosso, who testified he was the owner of the car in question on the date Schwartz alleged he had purchased it in Detroit. The car, Wilson said, was later sold to White. An Owosso garage owner, in whose place the car was stored on May 22, corroborated Wilson's testimony.

Only one ballot by the jury, which returned a verdict of guilty in 15 minutes, was necessary.

The Detroit Automobile Club advises motorists to place on the various parts of their cars some marks by which the vehicle can be distinguished, even though it be torn down to be sold piece by piece.

Action of this kind by all owners of motor vehicles would help cut down automobile thefts greatly, especially in large cities.



Home of Jones Motor Car Co., Wichita, Kan., the Biggest Metallic Trade Factory in the Agricultural Sunflower State.

"We, in the Mitchell organization, both at the factory and out among our big dealer body, are doing everything we can to make automobile owners everywhere see the wisdom in Hooverizing automobile driving, if I may put it that way, just as they have their methods of living."

JONES MOTOR CAR PLANT THE BIGGEST IN KANSAS.

The Jones Motor Car Co., manufacturers of the Jones Six, has greatly increased the manufacturing facilities at its big plant at Wichita, Kan., through factory extensions and additional equipment. The plant now consists of five large factory buildings with an office building. Two models are being made, the "26 B," a touring car, and the "26 A," which is a five-passenger roadster.

A BRIEF FOR HOOVERIZED DRIVING

John W. Bate Advises Extra Care on the Part of Every Automobile Driver in America

JOHN W. BATE, vice president of the Mitchell Motors Co., Inc., Racine, Wis., touches on a timely subject in a recent interview on economical operation of the motor car.

"Nowadays," said Mr. Bate, "every patriotic citizen is interested in knowing how to work, eat and live in the most economical manner. We have been told by Mr. Hoover that while we most certainly should eliminate all extravagance from our methods of living, still we should not be frugal to the extent of impairing our efficiency.

"Just as these interesting facts apply to our eating, work and recreation, so they also apply to driving a car.

"Many good patriots every day are wasteful and even extravagant in the way they drive their cars—not that they drive too much, but rather that they do not follow the ordinary precautions which will make their car last longer and go farther at a minimum expense.

"For instance, did you ever notice how some drivers take turns? A honk of the horn—a rush of air and they're gone—if the road is clear. If it isn't the brakes lock with a slam; the wheels slide; there's a smell of burned rubber; the clutch is disengaged; the motor races its head off. And what does this all mean? Useless wear on tires; excessive waste of gasoline and oil; severe strains on the engine and certain damage to the brakes.

"The greatest racing car pilots the world has ever known slow down for turns on the track. They do that because they know how to get the utmost out of their speed. I cannot figure out why some passenger car drivers don't use the same good judgment.

"How much easier and more economical it is to allow the motor to slow down the car! This will save gasoline and oil; will lengthen the life of the brakes

and will not work any hardship on the engine.

"On the other hand I've seen many drivers who literally waste as much gasoline in stopping and starting as they probably use on the whole trip.

"It's absolutely unnecessary to race a motor in making a stop. This practise wastes gasoline and oil and certainly doesn't help the motor. In starting all one has to do is to speed up the motor just enough to pull away from the curb smoothly.

"I feel pretty strongly on this subject," said Mr. Bate, "and I believe that a little extra caution on the part of every automobile owner in America will make it possible for all of us to get the utmost out of every drop of gasoline and oil we use, and at the same time prolong the life of our cars.

GUARDED AGAINST AIR SURPRISE.

A large searchlight, powerful enough to detect a Zeppelin or airplane, has been erected on the roof of the chemical laboratory of the Mason Tire and Rubber Co. at Kent, O., and plays nightly upon a painted bulletin placed on the factory water tank. The searchlight is a 24-inch battleship reflector, with a 1000 watt lamp, controlled by an auto time switch eight-day clock. The ray from this powerful lamp is thrown 700 feet to the water tank, which towers 125 feet in air.

TORBENSEN OPENS NEW BUILDING.

The Torbensen Axle Co.'s new building for the manufacture of three and five-ton front and rear truck axles, has been completed and the event was observed at the plant with an entertainment in the new structure, which was attended by 300 of the employees and their friends. Refreshments were served, followed by dancing, and the affair proved very successful. W. F. Rockwell, assistant general manager of the company, had charge of the arrangements.



End of One of the New Buildings of the Torbensen Axle Co., Cleveland, O., of Standardized Automobile Plant Construction.

SCIENTIFIC FUEL SAVING DUE

Improved Refining and Engine Design Suggested Instead of Motorists' Dribbling Conservations

W. P. DEPPE, in a paper read at the meeting of the Metropolitan Section, S. A. E., Nov. 22, in New York, pointed out a method of engine design or improvement in carburetion so that a fuel composed of half gasoline and half kerosene can be utilized with a result of trebling the supply of motor fuels.

The paper was a rather long one and dealt to a considerable extent on the economical aspects of the fuel situation and its relation to prosecuting the war. Excerpts from the paper, touching on the salient points of interest, are given as follows:

"If any man can demonstrate such methods as commercially developed," says Mr. Deppe, "and by agreement beginning on the first of January, 1918, or any other future date, all new cars, trucks, tractors, etc., and even aeroplanes, were equipped to handle not only half kerosene and half gasoline mixtures, but could also handle with the same operating ability of true gasolines a low grade motor fuel oil consisting of 50 per cent. to 40 per cent. of all crudes, and allowing that in five years all existing vehicles will be worn out or become impossible to operate on such low grade fuels, but are in the meantime replaced by better engines and vehicles, it would mean with the cracking methods suggested by the bureau of mines that oil refiners could almost triple the production of what is now motor gasoline, consisting of but 18 per cent. of crudes produced in the world. That means nearly 200,000,000 barrels per year of motor engine fuel oils acting like true gasoline would be available.

"It seems to the writer to be an economic wrong of the first magnitude to pursue methods and use mechanisms with operating ability in motor vehicles which limit the oil refiner in the production of what is known as commercial gasoline to less than 18 per cent. of the total crude oil production of the world. He is only limited by carburetion methods now in use, his refinery capacity and ability being ahead of demands for refined oils and crude production.

"All nations have reached a point where as in the case of the steam engine means and methods must be devised and considered for immediate application, which will have the effect of not only producing more crude oils from existing or possibly new fields in the world, but effort should be made to devise means and methods of securing more than 18 per cent. of the desirable refined oils out of the crudes in the oil refineries for motor fuel, and what is the main theory the writer is endeavoring to suggest in this paper is the securing of more useful work out of each pound of the fuel oil used in internal combustion engines of any type. All cars now

average less than 12 miles per gallon of gasoline. This average can be nearer 18 to 20 miles per gallon by better carburetion means, using mixtures of half gasoline and half kerosene or distillates and low grade fuels.

"Before we can suggest exact improvements in engines and oils and oil refining we must consider some things not clearly brought out as a rule.

"Oil refiners can now use in large commercial operations the following general types of cracking methods whereby it is possible to increase the production of so-called gasoline:

"First. Cracking oils as liquids with heat and pressure.

"Second. Cracking oils in vapor state with heat and pressure.

"Third. Cracking oils by the addition of steam or hydrogen, etc., in both the liquid and vapor states with heat and pressure.

"Fourth. Cracking oils in the superheated gas phase by adding steam and using pressure and temperature which causes partial combustion in the distilling plant.

"Men may devise gas producers using mineral oils whereby through applying high heat to the liquids or even using temperatures high enough to cause a partial combustion in the gas producer to make superheated dry gases, but not necessarily homogeneous fixed dry gas mixtures in cylinders, when they attempt to transfer such superheated gas to the intake manifold, the valve chambers or even into the cylinders themselves, where additional air supply is furnished. They are baffled by the loss of power and low fuel economy, lubricating oil dilution, etc., and perhaps do not realize that the expansion or intake stroke of the piston acts like a condensing chamber in the cracking process of the oil refiners as already mentioned herein, and pressure or compression raises the boiling point at some engine speeds and throttle openings.

"Many men do not realize that the time limit is so short for the movement and mixing of air and oil between carburetor and cylinder. It is not an easy thing to make superheated homogeneous fixed dry gases in any device which will allow the mixture to maintain itself as a superheated dry gas to the bottom of the intake stroke, so that the compression stroke will not waste its heat in merely partially vaporizing the liquid fuel oil more or less mixed with the lubricating oil, as now is the case with present wet mixture carburetor methods and present day low volatile and average of heavy hydrocarbons, known as commercial gasoline.

"It is no permanent solution of a disagreeable problem to suggest curtailment of the use and production of passenger cars or to suggest a painfully small possible saving of gasoline in the hands of 5,000,000 gas engine users by stopping so-called leaks, incidental to the very use of gasoline in routine life.

"Prophecy is a dangerous pastime for anyone, but if the present world wide war lasts much longer, economic necessity will ultimately compel some military dictator to prohibit the sale of any motor truck or passenger vehicle using oil fuels which do not show at least 75 to 80 ton miles on ordinary roads per gallon of fuel consumed running at an average speed of 10 miles per hour."

Discussion centred on shortage of fuel in the Allies' transportation system.

BEARINGS SERVICE MEN WILL MEET IN CONVENTION.

Representatives of the Bearings Service Co. will hold a convention at the general offices in Detroit, Dec. 20 and 21. These men have been traveling for the past four months, establishing service agencies in the smaller towns and cities of the territories covered by the 22 branches. In the territories contiguous to Boston, Detroit, Chicago, Kansas City, Minneapolis, Omaha, Seattle, Los Angeles and Indianapolis, 175 agencies were established up to Dec. 1. This number will be increased to at least 450 within the next few months.

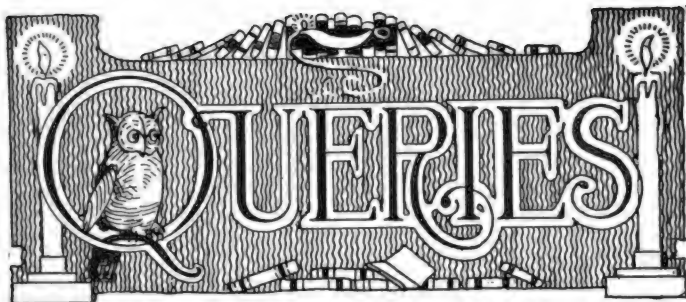
DETROIT STARTER CO. CHANGES ITS NAME.

The Detroit Starter Co., Detroit, Mich., has changed its name to the Versal Products Co., the change being made as the various devices produced by the company for some time have borne the trade name "Versal," and the manufacture of starters was discontinued some time ago.

A line of electrical apparatus for Fords is manufactured by the company, which enjoys close relations with the Ward-Leonard Co. through an exchange of patents. The Genolite, the principal product in this field made by the company, has gained great popularity as a lighting system through a patented drive, which eliminates the troubles that have been found with lighting systems on Fords in the past.

A big sales campaign will soon be inaugurated by the company on the Speederator, a device for Ford cars, which automatically regulates the speed of the engine and does away with racing the motor, stalling and bucking. Over 25,000 of these devices have been sold since the company started manufacturing them about a year ago. Thomas F. McManus, Inc., Detroit, will direct a national advertising campaign on this product, which will be launched in January.

Officers of the Versal Products are: President, J. W. Fitzgerald; secretary and treasurer, H. Kirk White. C. F. Krueger is sales manager.



NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU PREPARE TIRES FOR WINTER STORAGE AND WHAT ATTENTION DO YOU GIVE THEM IN WINTER?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of January. The contest is open to every one.

EFFICIENT USE OF THE SPARK LEVER.

Best Letter.

(R. L. Prindle, N. Abington, Mass.)

There is a right and a wrong way to use the spark lever on an automobile, and but few people realize how much power may be added by the proper advance or retardation of the spark.

After the engine is started the lever should be advanced in proportion to the speed at which the engine is running; not according to the amount of work the engine is doing.

This advance is needed because after the electrical contact has been made a short time elapses before the charge is ignited and sufficiently expanded to secure maximum pressure, and, of course, maximum power.

The higher the piston speed the earlier in the stroke should the timer contact be made in order that the highest pressure may take place at the most advantageous point. The spark should be advanced or retarded to the point where the engine pulls the best.

As the car slows down and the engine speed decreases, either from closing the throttle or because of excessive work, the spark must be retarded or the engine will pound and the explosions tend to force the pistons and crankshaft in the wrong direction.

A good operator learns to observe the effects of manipulating this lever and act accordingly. He can gauge the lever position for engine speed and gradually retard the spark as the engine is slowed down by work, always keeping just ahead of the knock.

The speed of the car should never be reduced by retarding the spark, as this results in a waste of fuel, overheating of the engine and an element of danger from firing through

(When Writing to Advertisers, Please Mention The Automobile Journal.)



THOSE who desire from their cars the utmost efficiency and the utmost reliability, who desire to be without the annoyance of constant battery attention, specify

BOSCH

MAGNETO IGNITION

BOSCH MAGNETO CO., 204 West 46th St., New York

Service Stations in Every State

For Motor Truck Upholstry



TRUCK SPECIAL

Satisfactorily meets the scarcity-of-leather situation. Costs less than even the poorest split leather but wears better.

Comes in 60-yard rolls 50 inches wide. Cuts in multiples without waste.

You should use it to save money.

You should use it to save leather.

It is waterproof, washable and its fine leather appearance and "feel" leave nothing to be desired.

*Write for Truck Special Booklet,
Samples and Prices*

DuPont Fabrikoid Co.,

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Works at Newburgh, N. Y. and
Fairfield, Conn.

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*World's Largest Makers
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FREE TOURING MAPS



**CHECK MAPS DESIRED
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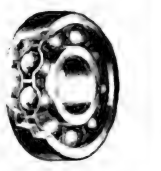
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**TIMES BUILDING
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the muffler. It is better to retard the speed by reducing the fuel.

For starting the engine the spark should be retarded so as to occur after the piston has started on the down stroke. After it has been started the spark should be advanced as far as possible without causing the engine to pound.

It often happens when proceeding along a fine level road, or slightly down hill, very good speed can be made without much throttle opening, by having the spark well advanced. Under these conditions the throttle should not be opened too suddenly.

A great deal is required of the ignition system today, since many of them are required to deliver about 60,000 sparks per minute, due to the engine speed, which may be from 1500 to 2000 revolutions per minute. The system must be kept at its highest efficiency and to do this the spark lever must be correctly handled.

Correct use of the advance and proper upkeep of the system means less gasoline consumption and a smoother running engine.

Second Best Letter.

(R. S. Albertson, Benton, Pa.)

Proper manipulation of the spark lever means much when engine efficiency is considered. When an engine is being started by the hand crank the spark should be fully retarded to prevent back firing. When the starter motor is used, however, the spark may be advanced from one-quarter to one-half on the quadrant.

After the engine has been started the spark lever should be advanced about two-thirds of the quadrant distance and left this way until the gears have been changed to direct drive, then fully advanced.

The fully advanced position is correct for level and good roads. When a grade or hill is encountered which causes the engine to pound, the spark should be retarded until the knock ceases.

If it is found necessary to change gears, due to the laboring of the engine, the spark lever should be retarded about one-quarter of the quadrant until the gears are changed, then fully advanced as the engine gains in speed.

The spark lever should always be retarded as the engine speed is decreased from any cause and advanced with the speeding up of the engine. This is the best way to obtain full efficiency.

EXCESS OIL IN CYLINDERS.

(C. R. S., Saratoga, N. Y.)

I have an eight-cylinder Oldsmobile that leaks oil past the rings and fouls up the plugs. Upon taking off the cylinder head I found oil on three of the pistons. Would you advise the installation of leak proof piston rings?

The clutch or transmission gives trouble at times and I find it difficult to change gears to second and third speeds. What do you think is the trouble?

There are three causes for excessive oil supply and leakage into the explosion chamber of an Oldsmobile engine. Excessive pressure in the oiling system, scored cylinders or poorly fitted piston rings.

The oil pressure gauge on the dash board should show a pressure of from 10 to 20 pounds when the engine is running at a speed corresponding to from 20 to 25 miles per hour. The pressure regulator is mounted on the left side of the crank case at the forward end. If the pressure is too high, unscrew the regulator adjustment until the adjustment is correct.

Examination will show whether the cylinders are scored. Small scores may sometimes be filled by Dixon's graphite. With the engine running at normal speed feed two or three teaspoonfuls of flake graphite into the carburetor air intake. If this fails to fill the scores the cylinder blocks should be either welded or filled by the plating process. You may also have the cylinders reground or rebored and new pistons and rings fitted.

If the cylinders are not scored or out of round, leak proof piston rings are to be recommended. That this type of ring

is giving satisfaction is evidenced by the fact that some car manufacturers have adopted them as regular equipment.

Your trouble in getting into the various speeds is probably due to rough teeth on the sliding gears of the transmission. The "grinding" of gears in changing gears burrs over the edges of the teeth so that they do not slide into mesh easily. If the teeth are not too badly worn you may be able to file off the burrs and round over the teeth so that they resemble their original shape. If the teeth are worn the only remedy is replacement of the gears.

SHORT LIFE OF LIGHT BULBS.

(C. B. R., Depew, N. Y.)

Will you kindly tell me why the lights on my Studebaker 1914 car burn out? They light to normal candle power under ordinary conditions, but flare up when the starting switch is pressed.

In answer to yours of the 3rd relative to trouble with the lights on a Studebaker 1914 car. The side lights should not light up when the starting switch is pressed.

Your trouble is evidently due to a short circuit in the system at some point, probably between the battery and the starting switch; between the battery and the starting motor; or between the starting switch and starting motor.

The starting current from the earlier 1914 Studebaker cars was 12 volts, while the lighting current was only six. Should there be a cross circuit between any of the starter wires and the lighting wires, a result similar to your trouble would develop.

Make a careful examination of the wires in the starting system, as well as the starter switch and see if the wire is frayed or the insulation broken at any point. The starter wires leading between the units enumerated in the second paragraph above can be easily located because they are somewhat heavier than the other wires.

OVERLOADING A FORD MAGNETO.

(E. M. T., Fayetteville, N. Y.)

I have recently installed nine volt four candlepower dash and tail lights on my Ford 1917 car. Do these lights overload the magneto too heavily?

The installation of a four candlepower light on the dash, as well as a tail light of the same candlepower, both lighted by current from the Ford magneto, is not to be recommended because of the strain upon the magneto.

We would suggest that you replace the four candlepower lights by two candlepower bulbs, thus relieving the magneto from some of the strain. The main trouble that you will find with this excessive overload will be the demagnetization of the permanent magnets in the magneto, evidenced by insufficient current in the ignition system and dull burning of the lights.

Just how long it will take to weaken the magnets depends upon the use of the lights, the speed of the engine and the type of lamp. There is little danger of burning out the magneto, since that unit is designed to carry an excessive overload.

KEROSENE AS A CARBON REMOVER.

(L. W. W., Westford, Mass.)

I have tried kerosene as a carbon remover, as directed in your Nov. 25th article, and though it has given satisfaction in a Ford car, after using it on my Maxwell, the engine skipped badly and upon examination I found that the flakes of carbon had caught between the valve faces and seats. What do you think of hydrogen peroxide as a carbon remover? Is it efficient, with no dangers and how should it be applied?

How can I pack the top of a double acting air pump, the smaller cylinder, so that it will be air tight?

The writer has had considerable experience with kerosene as a carbon remover and always found it entirely satisfactory if properly used. Where the engine is heavily carbonized the carbon is removed in large flakes and has a general tendency to catch in the valves and plugs.

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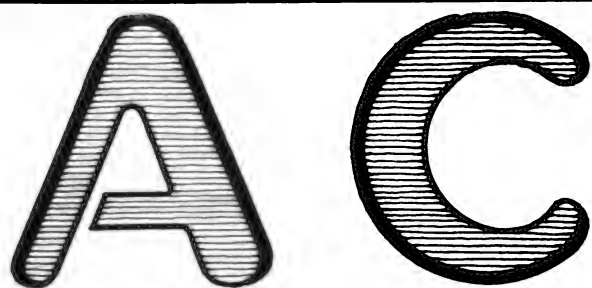
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These flakes may be removed from the valves, in most cases, by rotating the valves from the outside, while the engine is being turned by hand. In other engines, when the plugs are removed, the valves may be reached by a fine wire and scraped free from carbon.

After an application of kerosene in a heavily carbonized engine the plugs should be cleaned. If the carbon is removed once a week it does not have time to accumulate and the kerosene method is effective.

That the use of kerosene is effective is evidenced by the flakes of carbon lodging in the valves in your engine. We would not recommend the use of hydrogen peroxide because of its high oxidizing effect, since doubtless the excess oxygen will cause oxidization of the smooth cylinder walls, as well as the valve faces.

The writer has tried a number of packing substances for the small cylinder of a compound air pump and found that a leather washer answers the purpose of preventing the escape of air around the plunger. A washer of the proper thickness may be obtained from a plumbing supply house. These washers, which are used for water faucets, have a small hole in the centre, which may be slightly enlarged to fit the plunger.

The washer should be cut to fit the inside of the stuffing box and pared thin enough to permit the screwing in of the stuffing box nut, then soaked in oil for three or four hours. The hole should be left slightly small and slipped over the top of the plunger after the handle has been removed.

BURNING OF BREAKER POINTS.

F. H. H., Rochester, N. Y.)

The points on the breaker arms of my Atwater Kent unit have a tendency to burn away very rapidly, can you tell me the reason for this?

There are two reasons for the burning away of the breaker points in the Atwater Kent system, both caused by excess current. The first is improper spark plug electrode

adjustment, the second (which is probably the reason for your trouble) is a broken down condenser.

The gap or distance between the two spark plug points should be from .027 to .030 of an inch—no wider, and all plugs should be adjusted the same.

The condenser, which is located in the coil, is designed to absorb the excess current and reduce the arcing at the breaker points. If for any reason the condenser should become short circuited or broken down, arcing will commence at the breaker points and they will be burned away very quickly. If this is the case we would suggest that you return the coil to the makers or have it replaced at a service station.

CHANGE OF OIL IN COLD WEATHER.

(E. C., Jersey City, N. J.)

Do you think that it is advisable to change the oil in my engine lubricating system with the coming of cold weather? I have received a number of opinions from different drivers and they do not seem to agree. I am satisfied with the present grade of oil, it is merely a question of light and heavy.

Many of the oil companies publish a chart showing the various grades of oil to be used for different prevailing temperatures. As a general rule an engine requires a lighter oil in winter, though this rule is not arbitrary.

Where the car is kept in a heated garage and is not left standing outside in the cold, the same oil may be used in both winter and summer, because while the engine is running the lubricant is kept warm by the heat of the engine.

If the car is left exposed to low temperatures, however, the oil in the engine base will thicken up and fail to lubricate to a certain extent. Such a condition is very bad for an engine having a force feed system, for the reason that the pressure is not great enough to force the congealed oil through the oil tubes for a few minutes, or until the oil is warmed by the engine action.

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THE PACKARD TWIN SIX.

(Continued from Page 13.)

removal of the cylinder blocks is unnecessary unless the cylinders are worn or the castings broken.

After the engine has been taken from the chassis the first step is the removal of the vibration damper, which is located on the front end of the crankshaft and upon which is carried the ratchet for the hand crank. Take off the four nuts which retain the springs and the front part of the damper may be removed, exposing the clutch unit, which is retained by the starting crank ratchet.

The starting crank ratchet is fitted with a left hand thread and should next be removed. The clutch unit may then be pulled from the crankshaft with a wheel puller.

In replacing this vibration damper unit it should be assembled and the spring tension tightened by the four nuts until the clutch slips at from 90 to 140 pounds, according to the make and equipment of the engine. This may be determined by winding a rope around the fan belt groove and attaching a pair of spring scales to one end of the rope. The scales may be fastened to a joist or other stationary object while the hand crank is being turned. The 1916 vibration damper should slip at 90 pounds, the 1917 four-ring and heavy piston installation at 110 and the 1918 four-ring installation at 140 pounds.

Twelve cap screws fasten the front timing gear case to the crank case; these should be removed and the timing gear cover taken from the housing. On the timing gear cover is mounted the helical gear and shaft which drives the distributor. The gear is retained by a nut and keyed to the shaft. When the gear is removed the shaft may be lifted out of the case.

Unless the timing gears show evidences of wear or the teeth are broken, it is inadvisable to remove them from their respective shafts, for both the cam and crankshafts may be taken from the engine without taking off the gears.

Both the crankshaft oil ring and the timing gear are keyed to the shaft and may be pulled off with a wheel puller. The helical distributor drive gear, as well as the camshaft timing gear, are fastened by cap screws; the first to the second and the second to the camshaft.

The camshaft may then be slipped from the front of the engine. The front camshaft bearing may be driven out with a piece of lead or wood from the inside. The centre bearing is held in place by a set screw, which must be removed before the bearing is driven out. The rear bearing should not be driven out until the oil tube fitting connecting with the pressure gage is removed.

The crankshaft may be dropped from the bottom of the engine when the three main bearing caps have been taken off. The bolts which fasten the clutch drum to the flywheel, as well as those bolting the flywheel to the crankshaft flange, should be examined and if they do not fit the holes in the pieces they should be replaced with larger bolts, the holes having been reamed to fit.

After the gasoline pump has been removed from side of the crank case the shaft may be pulled out from the same side. Both of the gears on this shaft are keyed on by means of Woodruff keys. This does not apply to the 1918 model, as on this machine the gasoline pump is located on the end of the generator shaft.

The transmission gearset and clutch unit are connected to the propeller shaft through a universal joint and the bolts which fasten the universal joint flanges together should be removed, the brake control rods disconnected and the change gear lever, together with the transmission cover plate, taken off. The transmission may then be taken from the car.

After Removing the Transmission.

With the transmission from the chassis the first step is the removal of the clutch unit. Unbolt the clutch shifter yoke from the pedal shaft and remove both the yoke and shaft. The clutch unit is mounted on and in the clutch spider, which is fastened to the main driving shaft by a nut and kept from turning by a key. A wheel puller may be used to remove this unit from the shaft.

The clutch unit is built up upon the clutch spider and consists of a number of steel discs placed between other discs which are faced upon both sides with special fabric. The fab-

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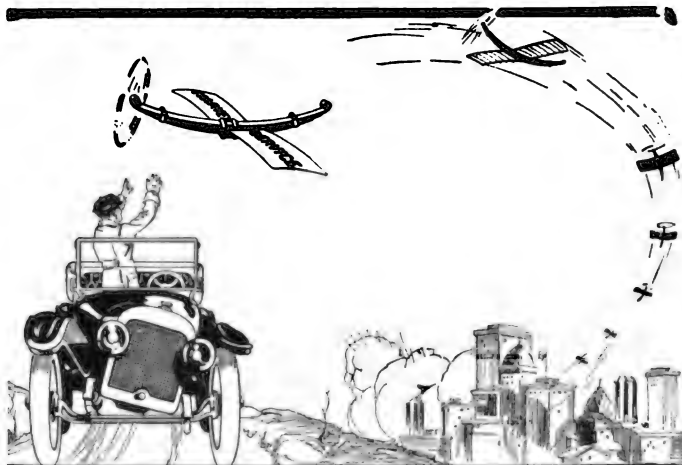
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“That’s service”! says the customer. And when his car is on the road again he tells his friends about it and they say with him, “That’s service”!

That *is* Service, Harvey Service, and it’s always ready to help you build a business that will be respected far and near. They may forget the name of the spring you used but the memory of the service you have given will never be lost.

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ric covered discs are termed the driving discs, while the others are the driven discs.

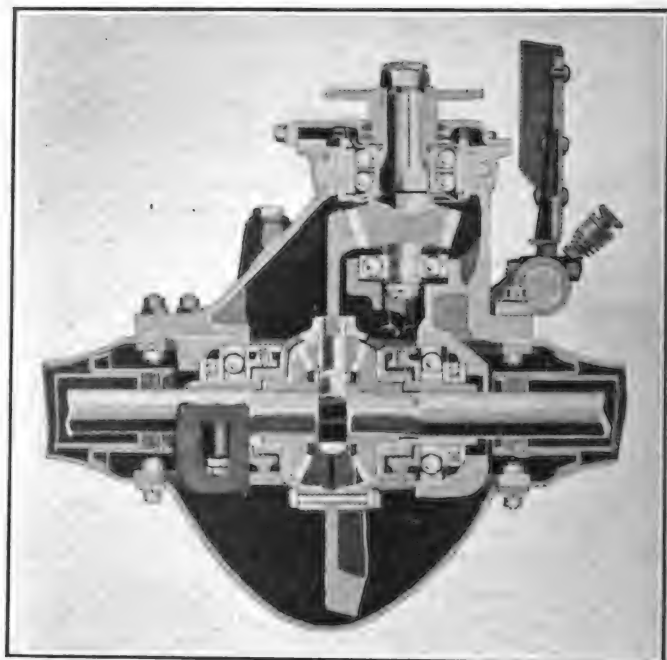
The driven discs are mounted on the clutch spider, which is fitted with keys and upon which the driven discs slide as the clutch is engaged and disengaged. The first driven disc is fitted with six studs, which project through all of the clutch discs and through the clutch spring sleeve, upon which is mounted the clutch throw out ball bearing.

Caution: Don’t Release Clutch Spring.

Between the clutch spring sleeve and the clutch spider, and inside the latter, is compressed the clutch spring. The expansion of the clutch spring pushes the clutch spider forward, the clutch spring sleeve backward, compressing the plate assembly. The six nuts should never be removed from the studs unless a heavy shop press is used for compressing the spring. Because the spring tension is great in pounds a heavy press must be used both to disassemble and assemble this unit, and if this is not available the clutch should be taken to the service station.

In replacing the clutch plates the keyways in the driving plates should be placed in line before the spring tension is released or it will be a difficult matter to slip the clutch back into the clutch drum, which is mounted on the flywheel.

On the 1916 and 1917 cars the clutch release ball bearing



Cross Section of Differential, Showing Bearings and Mounting in Casing.

is retained on the clutch spring sleeve by a clutch spring release collar, which is screwed to the spring sleeve and retained by a set screw. On the 1918 cars the bearing is held on the sleeve by a spring ring.

After the clutch unit has been removed from the main drive shaft the lock nut and retaining nut should be taken from the shaft. The lock nut is retained by a pin or wire, which must be removed before the nut can be taken off. When these two nuts have been removed the bolts which fasten the clutch and transmission housings together should be taken out and the two housings pulled apart.

Overhauling the Gear Units.

With the transmission unit removed the main drive gear, as well as the two sliding gears, may be taken from the housings. The sliding gear shaft is fastened to the universal joint flange by a castellated nut, which must next be removed and when this is done the shaft may be taken from the housing.

To remove the countershaft the reverse idler and the ball bearings, the caps must be removed from the rear of the housing. These caps are all fastened by either cap screws or studs and nuts. With the caps removed the countershaft nut is taken off, permitting the shaft to be drawn from the

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inside of the housing. The reverse idler pinion shaft is driven from the inside.

With the caps removed all of the bearings may be driven from the inside of the housing. In removing these ball bearings the blows must come against the outer races. An iron pipe of the right size is usually used for this purpose.

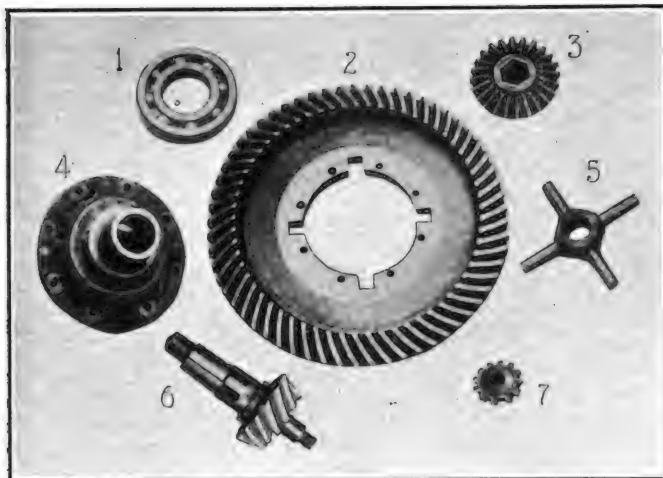
All of the countershaft gears are retained by pins and keys, and when the taper pins are removed the gears may be pulled from the shaft.

Rear Axle and Differentials.

The rear axle is of the one-half floating type and the differential and wheels may be removed without disturbing the axle housing. To disassemble this unit both rear wheels should be jacked free from the floor and supported by means of horses or boxes. With the car securely supported the wheel hub caps should next be removed, the nuts on the ends of the taper shafts taken off and the wheels pulled from the axle with a wheel puller.

A rear axle shaft bearing retainer is threaded into the housing and locked by a set screw. This must next be removed, permitting the removal of the shaft with ball bearing attached. The ball bearings are retained by a check nut, which in turn is fastened by a lock screw. With the lock screw removed the check nut may be unscrewed from the shaft and the bearings removed for replacement.

After the shafts have been taken from the housing the bolts fastening the differential carrier to the axle housing should be removed, permitting the lifting out of the carrier, together with the differential unit complete. This unit may



Differential Components: 1, Differential Ball Bearing; 2, Master or Drive Gear; 3, Differential Gear; 4, Differential Housing; 5, Spider; 6, Pinion Drive Gear; 7, Differential Pinion.

be handled much easier, if the differential cover plate is also removed.

Two differential carrier caps retain the differential assembly in the carrier. These caps should next be removed and the differential unit with bearings and adjustments removed.

The differential adjusting nuts, which are located on each side of the master or ring gear and mounted on the ends of the differential housings, need not be removed or the adjustment altered unless they show signs of wear. These adjusting nuts are designed to prevent side movement of the differential and to keep the proper relationship between the drive pinion and master gear.

Treatment of Worn Parts.

Eight bolts fasten the two differential housing parts to the master gear. These bolts are next removed, completing the disassembly of the differential. Due to the fact that the differential spider is mounted directly in the ring gear, there should be but little wear at this point. The differential pinions may be bushed if they show signs of wear. Each of the differential gears should be placed on its respective shaft and examined for play. These gears should fit on to the squared shaft with little or no play and should be renewed or the shafts renewed to prevent any lost motion, which

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tends to put a strain upon the other parts from the rear to the engine.

The rear universal flange, like the one at the transmission, is keyed to the pinion gear shaft and retained by a lock nut. When this flange is removed the two cap screws holding the pinion adjusting lock should be taken out, and the pinion adjusting nut backed from the housing, permitting the removal of the pinion gear, together with the rear ball bearings.

Adjusting Pinion Assembly.

In replacing the parts the pinion assembly should be replaced first and so adjusted that there is no play in the pinion shaft. This adjustment should not be made so tight that the gear binds, or the bearings will be destroyed very quickly. With the pinion in place the differential assembly is placed on the differential carrier.

If the differential adjusting nuts have been removed or the adjustment altered, the master gear and differential assembly should be so placed that the master gear comes up against the pinion or "bottoms." The adjustment on the left side should then be brought up against the bearings as far as possible, then backed off one turn to allow for clearance between the gears. The right differential adjusting nut should then be tightened against the bearing to prevent side play of this unit.

When this trial adjustment has been made the pinion may be turned by means of a hand crank to detect any grind or friction and the adjustments again made to bring the two gears to their proper relation.

The front wheels may be removed in the conventional manner by taking off the hub caps and unscrewing the retaining nuts. This is standard construction. The only caution necessary in assembling and adjusting the wheels being not to turn the nuts so tight as to cause the roller bearings to bind. There should be a very slight side play in the wheels to insure long gearing life.

The steering gear is of the worm and nut type and the novice should not disassemble this part. He is advised to take the unit to the Packard service station if repairs are necessary.

Timing and Adjustments.

All of the timing adjustments may be made through hand hole plates in the timing gear box at the front of the engine before the radiator is put in place.

In resetting the camshaft the arrows on both the crankshaft and camshaft gears should point directly upward and be in line with the arrow on the front end cover face of the engine. In this position the inscription on the flywheel "exhaust closes 1 and 6 R" will be on the top dead centre line of the engine, which is the centre between the two cylinder blocks, and number one right piston will be in the firing position.

If the chain has been replaced before the camshaft has been properly set, it may be loosened by turning the generator eccentric adjustment. This will give enough slack in the chain to permit the turning of the camshaft gear without turning the gear on the crankshaft.

The clearance between the valve lifters or tappets and the valve stem should be .004 of an inch with the engine cold.

To retune the ignition system first remove the small cover plate over the camshaft and loosen the three cap screws on the spiral timing gear. To be sure that the gear is loose the screws should be lightly tapped with a hammer. Next turn the engine shaft over until the flywheel mark "top dead centre cylinder No. 1" is seven-eighths of an inch past the highest point of its travel and the right front piston has slightly passed the top of the explosion centre.

Remove the right distributor head from the ignition apparatus and rotate the distributor arm until its position corresponds with the position of the No. 1 terminal on the distributor head and the timer contacts are just separating; then tighten the three cap screws on the camshaft spiral gear and replace the locking wire.

When the breaker arm rollers ride on the top of the cam the two circuit breaker arms should be adjusted so that there will be from .015 to .020 between the breaker points. The contact points should be smooth and parallel with each other, or the action will be uneven.

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Men of Draft Age Must Enlist Before December 13

The new selective draft regulations prevent any man from 21 to 31 years old enlisting after December 15th. In order to complete your enlistment (be examined, accepted and take the oath), you should positively report to any recruiting officer before December 13th.



Blankets won't help much if—

if the oil you are using does not flow freely at Zero.

SUPREME AUTO OIL flows freely at Zero.

STARTS WITH THE ENGINE

THIS is most important during the Winter months. You should know whether the oil you are using "flows freely at Zero". All oils do not possess this feature—notably the paraffine-base oils, which thicken up under cold and often cause great damage to the motor.

The safe way is to ask for **SUPREME AUTO OIL**—it "Flows freely at Zero" and leaves less carbon, owing to the fact that it is a Southern Asphalt-base oil containing no paraffine to gum, stick or thicken.

MANUFACTURED BY

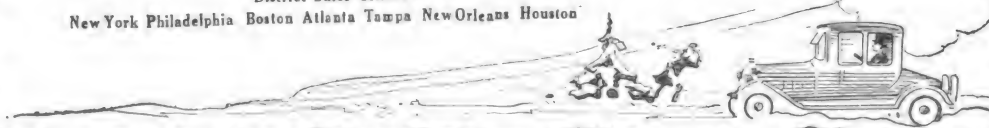
GULF REFINING COMPANY

The Largest Independent Refining Company in the World.

General Sales Offices: Pittsburgh, Pa.

District Sales Offices:

New York Philadelphia Boston Atlanta Tampa New Orleans Houston



AUTOMOBILE JOURNAL

DEVOTED TO
OWNERS OF NEW AND USED CARS, DEALERS AND REPAIRERS

VOL. LXIV.

PAWTUCKET, R. I., DECEMBER 25, 1917.

NO. 10.

No. 30 GARAGE SERVICE Sets



THE repairer who uses this combination of wrenches economizes in time and labor and adds greatly to shop facilities and shop productiveness.

Car owners reap the benefits and are assured of a good job, quickly done and at minimum cost. Every tool is specially designed and made to serve a specific purpose. These 30 wrenches, some with two sockets, are equivalent to 39 different sizes and types and are perfectly adapted for work on any car. The combination includes:

Offset Wrenches	13	Special Wrenches.....	5
Speed Wrenches	10	Demountable Rim Wrenches	3
L-Wrenches.....	6	Tee-Handle Wrenches.....	2
Total.....		39	

List Price, \$20.

With the No. 30 Garage Service Set the repairer has all wrenches needed, standardized equipment, and tools that insure the quality of work done.

COMPLETE WRENCH CATALOGUE AT REQUEST

WALDEN-WORCESTER

INCORPORATED

WORCESTER, MASS.



No. 30 GARAGE SERVICE SET

CARBURETOR SUPREMACY



ZENITH
CARBURETOR
COMPANY

RPM

NEWYORK
DETROIT
CHICAGO

ZENITH



The "Mosco" Trade Mark

On all cars built in America you find "Mosco" fittings and equipment.

"Mosco" specialties have been sold and recommended by jobbers and dealers for years.

"Mosco" quality is established. It has been proven by years of service. The "Mosco" trade mark brands equipment and fittings as the most desirable, serviceable and economical ever produced.

Specify "Mosco" trade marked specialties for the most enduring and dependable service, for these are guaranteed, and are known for their quality and the satisfaction they afford. Your jobber or dealer carries a complete line.

**Jobbers and
Dealers:**

*We request your
presence at our Special
Display at the*

Hotel Astor

*During the New
York Show.*

"Mosco" 1918 specialties include the following :

"Mosco" Ford Timer
"Mosco" Steering Rod Anti Rattler
Improved Bemus Timer
"Mosco" Floating Plunger Wheel Puller

"Mosco" Valve Spring Grinder
"Mosco" Socket Nut and Bolt Holder
"Mosco" Demountable Rim Tool
"Mosco" Valve Spring Compressor

MOTOR SPECIALTIES CO.

WALTHAM

MASSACHUSETTS

Another Great

This car will be exhibited at the New York Show—Space C-11, 3rd floor, Grand Central Palace.



This car will be exhibited at the Chicago Show—Space G24 to 49 in the Greer Building.

By World's Champion Light Six 6,202 Miles With SEALED Hood, Clutch and Transmission

CHICAGO to the Pacific Coast and back—no CHANCE to touch the engine—no chance to even LOOK at clutch or transmission—that is the latest wonderful record of the ELGIN SIX.

The Valve-in-head Motor never faltering on the steepest inclines, in the deepest mud nor the heaviest sands—.

The CLUTCH holding on

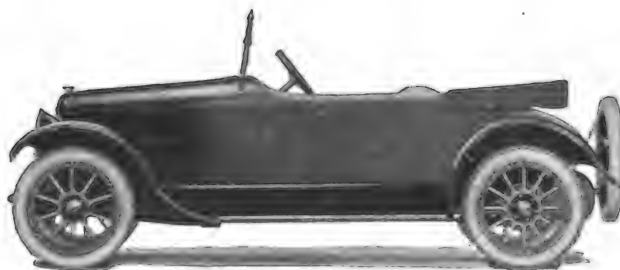
mile after mile of steepest mountain climbs—

The BRAKES holding fast on mile after mile of downward plunges—where slipping meant death—

What eloquent proof of the 100% *stamina* and *dependability* of this strictly stock ELGIN SIX.

And Economy—19.4 miles to the gallon of gasoline.

Elgin Six



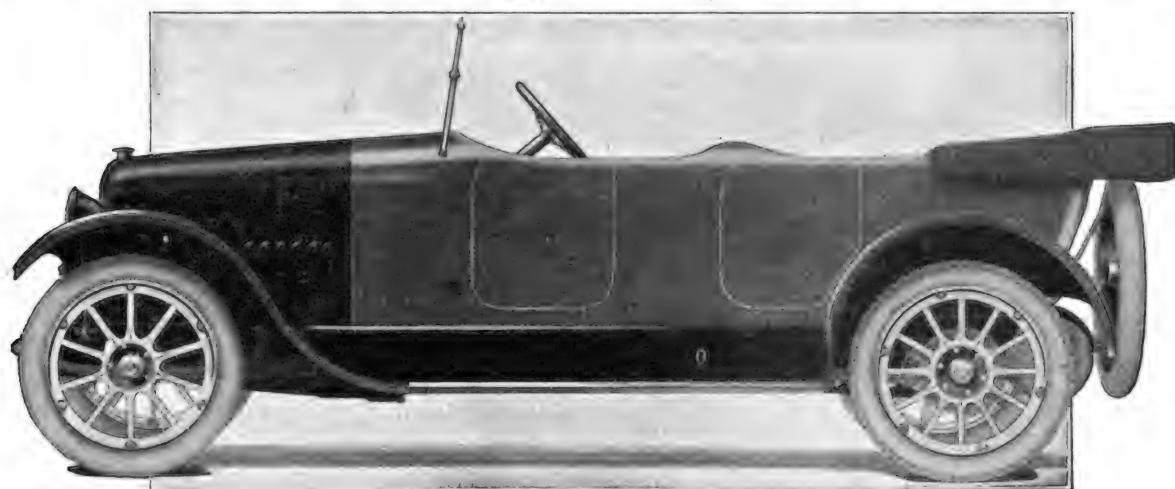
Elgin Six 4-Passenger Roadster, \$1095

F. O. B. Chicago

A car for business and professional use, as well as for all-'round driving. Roomy enough for four people, yet not too large for one or two. Front seats divided. Beautiful yacht-line design. A popular, practical model. Same chassis as touring car, with 117-in. wheelbase, valve-in-head motor, etc.

A full page advertisement of this story will appear
(When Writing to Advertisers, Please Mention The Automobile Journal.)

Victory Scored



Elgin Six 5-Passenger Touring Car, \$1095 F. O. B. Chicago

A roomy, impressive car. 117-inch wheelbase. Valve-in-head motor. Quality upholstery and finish throughout. Flexible, powerful, smooth running and easy riding. The most economical car of its size. Beautiful, durable. A family car which old and young alike enjoy.

ENGINE, clutch and transmission performed *without adjustment—without repair*—for two solid months of continuous travel under the roughest usage.

The Elgin climbed and descended the precipitous slopes of the Rocky Mountains; threading its way along tortuous, rock-strewn mountain trails; plunging through unbridged streams.

Without a break the car ran perfectly in the freezing, rarefied atmosphere above the clouds; and cooled perfectly in 132 degrees of desert heat, where heavy pulling increased the difficulty of *keeping* a motor cool.

A broken fan-belt—compelling the car to travel a thousand miles homeward *with a still fan*—a performance almost unbelievable—added a crucial test.

The record-breaking run from Chicago to Miami, Fla., the Minneapolis-Fargo dash, and many other famous ELGIN winnings had fairly earned for the ELGIN the title of "World's Champion Light Six."

Hence, when the officials of the Chicago Motor Club determined to secure authentic data on the condition of the two great national highways—The Lincoln Highway and The National Old Trails Highway—they selected the ELGIN SIX because of its previous wonderful records. It was made the "Official Scout Car," traveling under the

auspices of the Chicago Motor Club, the American Automobile Association, the Detroit Automobile Club, and many other Associations affiliated in the Good Roads Movement of America.

In the Service of the U. S. War Department

But the greatest honor was conferred upon the ELGIN SIX when Secretary of War Newton D. Baker, in a personal letter, appointed it Official Scout Car to report trans-continental road conditions to the War Department—to gather information that may prove most valuable to the War Department in emergency movements of troops and supplies.

It was a commission of honor for the ELGIN. No car had ever been sent on an errand so important to this Government. No car had ever been charged with a service so distinguished.

Successful dealers are fast coming to the Elgin Six.

A highly profitable connection may be awaiting YOU.

Wire for territory and full details.

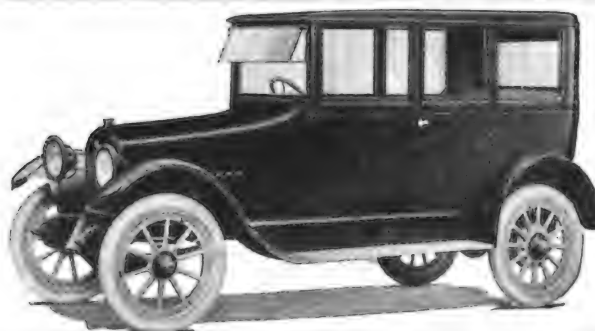
Address Dept. 12A

Elgin Motor Car Corporation, Chicago, U. S. A.

Elgin Six Sedan, \$1645

F. O. B. Chicago

A richly finished, luxuriously upholstered car that meets the all-season, all-weather requirements. Interior of best Bedford Cord. Plate glass windows. Silk curtained rear and rear quarter windows. Patented, adjustable steering wheel. Heavy Brussels carpeting for the floor. Electric dome light for interior.



Elgin Six

in the Saturday Evening Post, Jan. 12, 1918

(When Writing to Advertisers, Please Mention The Automobile Journal.)

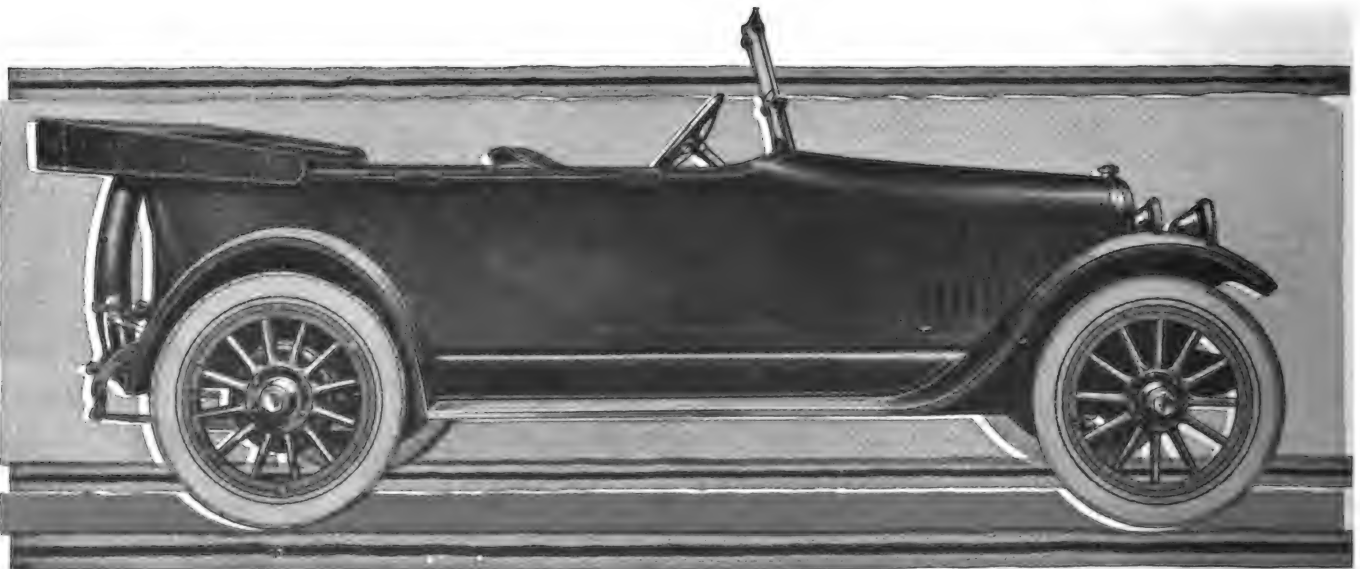
Auburn

Worthy Cars Backed

AUBURN SIX motor cars have always been notable for substantial value and decidedly moderate prices. In size and beauty they appeal to the eye of those who value appearance. In mechanical refinement they satisfy the experienced car owner who knows and appreciates thoroughly standard and tested construction, and finally they appeal to the careful buyers who make price an important consideration.

In the enclosed convertible models, the four passenger chummy roadster and sport models, the makers have attained a smartness which appeals to metropolitan buyers and which is seldom found outside of the most expensive cars. So comprehensive a line of cars as is offered in the Auburn Six line is unusual in the medium-priced field.

No other car has a better reputation for owner satisfaction—or fair dealing with distributors.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

By A Strong Company

The company's policies are established, its financial standing beyond question, and its history an open book.

Auburn Six dealers have worthy merchandise with responsibility back of it.

It has never been the Auburn policy to obtain wide distribution by putting in dealers who would be unable to get sufficient cars. There is good territory still open.

A cordial welcome awaits you at the Auburn exhibit at the New York show — second floor Grand Central Palace, or at the Chicago show.

In the meantime why not write for the new catalog and terms.

AUBURN AUTOMOBILE COMPANY

1401 South Main Street, Auburn, Indiana

Five-Passenger Touring Car 43 H. P.—120-Inch Wheelbase

\$1345

With Convertible Sedan Top.....\$1595

Four-Passenger Chummy Roadster.....\$1345

Four-Passenger Sport Model

in three optional color combinations

43 H. P.—120-Inch Wheelbase.....\$1395

55 H. P.—131-Inch Wheelbase.....\$1685

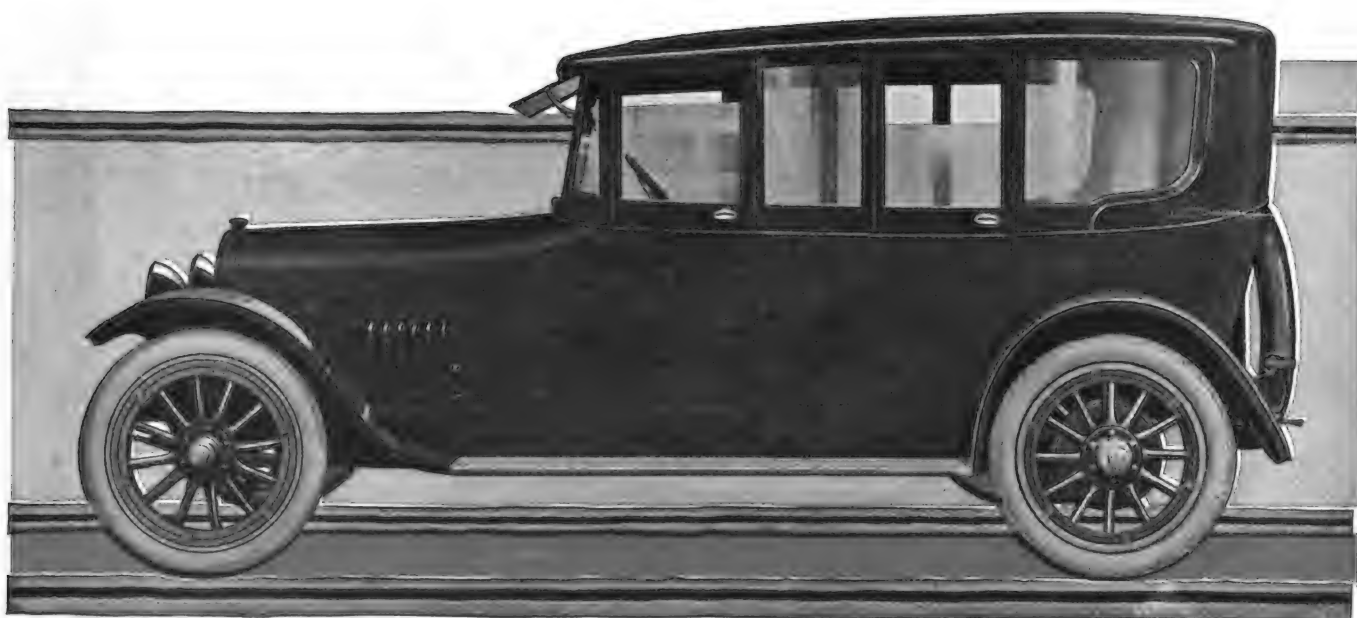
Seven-Passenger Touring Car

55 H. P.—131-Inch Wheelbase

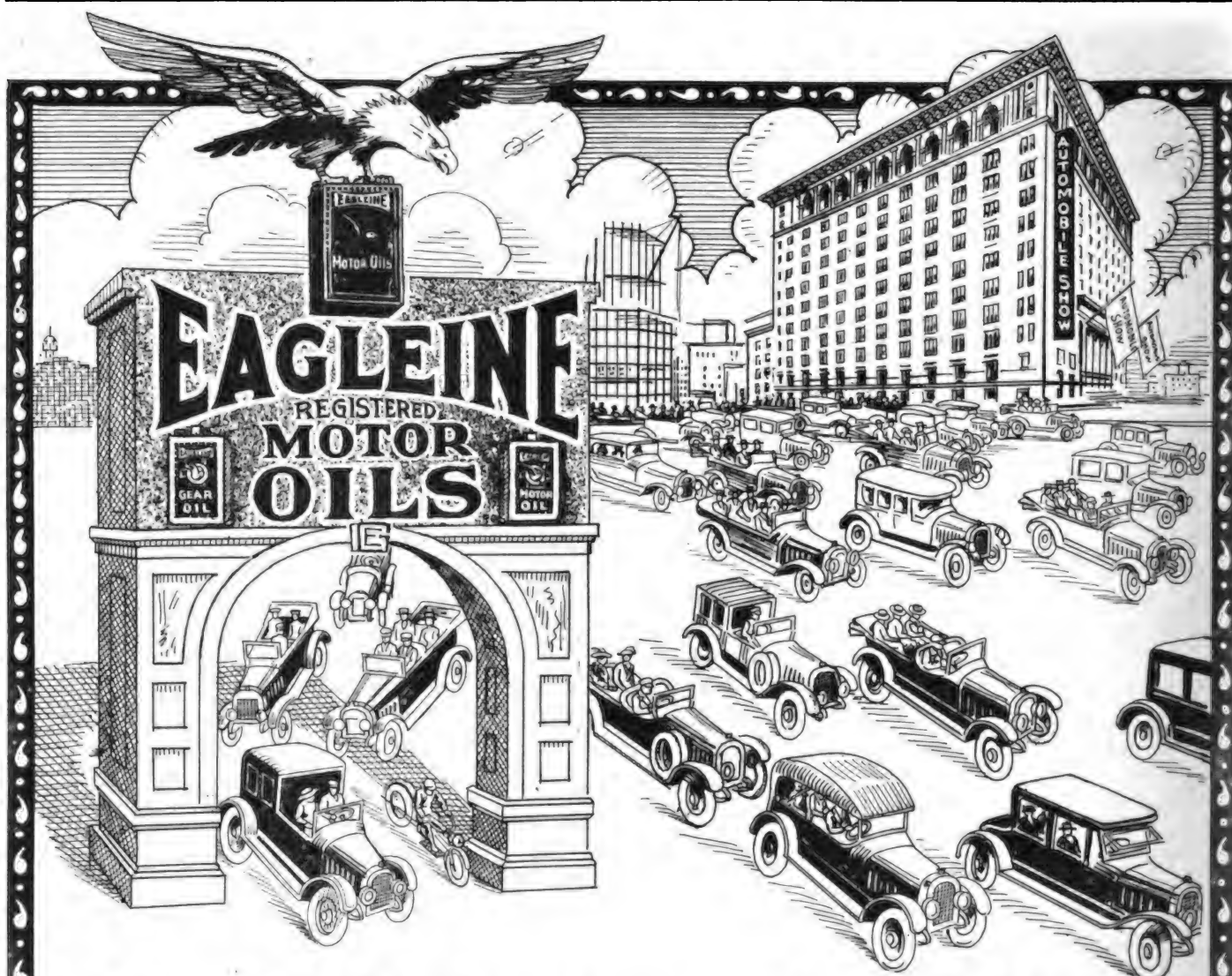
\$1685

With Convertible Sedan Top.....\$1985

Seven-Passenger Sedan Springfield Type,
\$2450.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



It Lubricates the Most

THE merit of EAGLEINE oils has established its standard among all leading engine lubricants.

More miles, less cost, carbon, wear and worry, more power, service and satisfaction has won for EAGLEINE oils the reputation as the leading quality oil for more than twenty years.

EAGLEINE oils have met every test. They are guaranteed to afford complete satisfaction and to be the most economical lubricants produced.

There is a grade for every engine. EAGLEINE is sold in sealed containers by all jobbers and dealers and in quantities to meet all demands.

Specify EAGLEINE, the lubricant with a service pedigree, as long as the cost is moderate. Look for the EAGLEINE trade mark.

EAGLE OIL AND SUPPLY CO.

44-45-46 India Street

Boston, Mass.

New York:
Woolworth Building.

Chicago:
1132 W. 37th Street.

Eagleine Gear Oil For Transmission and Differential Gear Sets

It is a scientifically compounded heavy oil. Unlike grease it will not solidify in cold weather. It adheres to the gears and forms a cushion that protects them against wear and friction. Extremely economical and affords car insurance and saves, as it eliminates repair bills.

Sold in sealed trade marked containers. A guarantee of quality and satisfaction that protects both dealer and consumer.

PAIGE

The Most Beautiful Car in America

PREPARE

We have a new year ahead of us. It promises to be a momentous year. We have many new problems to face. By "we" is meant you and we—motor car dealer and motor car manufacturer. Our destinies are identical. We must stand together and fight together and win together. Let us now, at the outset, face these new problems calmly, sanely and confidently. Let us prepare, not our "defense," but our "offensive" campaign now—and "go through" with it.

Let us tell you this first of all: The Paige-Detroit Motor Car Company is **ready**—right now. We know precisely what we **can** do and **will** do. We are sure of our impregnable financial position. We are sure of our production. We are sure of our sales. We are sure of our organization. We are sure of ourselves.

First of all, you must prepare for this year—as we have prepared for it. Hunt out and wipe out your own weak spots. Put your own organization on a war footing. Be sure that in your

"brigade" you have fighters, not "slackers." You may have to work harder to close sales. **But the business is here.**

You are dependent upon the company you represent to see you through when you are once "over the top." There are some "preferred" motor car companies—companies who have the popular cars, the courage, the experience, the vision and the financial resources to win the fight and help you win your fight.

The Paige is one of these "preferred" companies to stand in the front line, strong enough to stand any shock, organized, equipped and confident to win the bitterest battle.

The Paige is going to stand by its dealers. The Paige has the financial strength, the prestige, the public confidence, the organization to "come through" any conceivable situation. The Paige in 1918 will build enough cars for all Paige dealers and will sell every Paige car that is made. It is "preparedness" that wins battles. Are you prepared?

PAGE-DETROIT MOTOR CAR COMPANY DETROIT, MICH.



HAYES WIRE WHEELS

Licensed Under Patents Owned and Controlled by the Wire Wheel Corporation of America

The fact that so many of the leading automobile manufacturers equip with "Hayes" Wire Wheels is a tribute to "Hayes" quality. "Hayes" leadership is built on superiority in design, material and workmanship. Write for the "Handbook on Wire Wheels."

New England Service
and Sales Station:

BOICE PERRINE CO., Boston, Mass.

CASTLE & KYTE, Exclusive Sales Agents, 890 Woodward Ave., Detroit, Mich.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



RAYFIELD

CARBURETOR

Hooverizing on Gasoline

YOU don't relish a half-baked potato; and it has little nourishment. Improper cooking wastes food.

Half-consumed gasoline—from improper carburetion—is likewise waste. It goes up in vile-smelling, black smoke which marks the inefficient, extravagant car.

We're all "Hooverizing" these days. We must conserve fuel as well as food. The Rayfield Carburetor will get every possible ounce of power out of your gasoline.

We guarantee this: 20% to 50% more miles per gallon and better all-round performance. You can test a Rayfield on your car; cold weather is a good time. If you're not convinced, we'll gladly refund your money.

Findeisen & Kropf Mfg. Co.
2127 Rockwell Street, Chicago



Two interesting booklets, "The Evolution of the Battleship" and "The Story of the Tire" sent free upon request.

DREADNAUGHT TIRES

For power, ruggedness, dependability and endurance; for ability to stand up against constant, ruthless hammering of the road the DREADNAUGHT TIRE is supreme.

5,000 MILES GUARANTEED

In two attractive red treads—the DREADNAUGHT Reinforced Vacuum Tread, which has solved the skid problem, and the DREADNAUGHT Ribbed Tread, the front wheel favorite.

BOICE-PERRINE COMPANY, BOSTON

New England Distributors

48-50-52 Cummington Street

(When Writing to Advertisers, Please Mention The Automobile Journal.)



No Day Too Cold for POLARINE

The Standard Oil for All Motors

Polarine Oil gives mid-summer lubrication in mid-winter weather—maintains the same efficient film of oil between cylinder wall and piston. Heightens compression—lowers engine heat. Always high-grade—dependable.

And for quick starts, snappy pick-ups, no matter what the season, use SOCONY Gasoline. Pure, uniform, reliable.

Look for the Red, White and Blue SOCONY Sign.

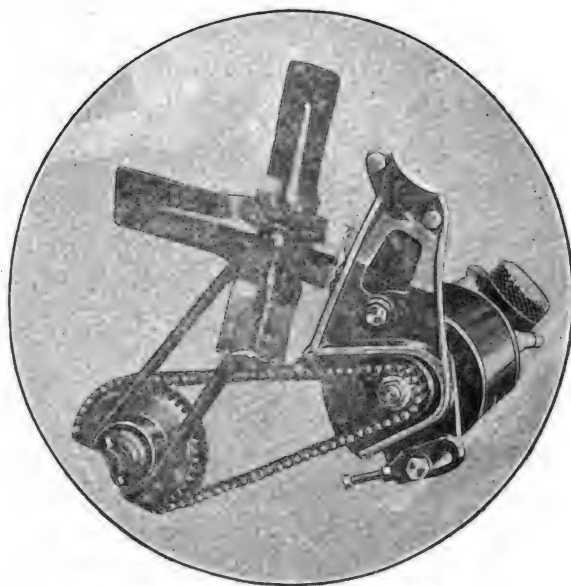
STANDARD OIL CO of NEW YORK

(Principal Offices)

NEW YORK
BUFFALO

ALBANY
BOSTON

POLARINE



This is the New
1918

Genemotor

Trade Mark

EVERY Dealer who comes to Boston should see the New 1918 Genemotor. It is the lightest, strongest, most compact, efficient starting and lighting system for Ford Cars.

You will want the agency for your town. It is a wonderful money making opportunity. Let us mail you a catalogue.

Write for it today.

⚙ Built by the General Electric Co. ⚙

BOICE PERRINE CO.

New England Distributors
48-52 Cummington St., Boston, Mass.

A. J. PICARD & CO., Inc.

General Distributors
61st Street at Broadway, N. Y.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

A BATTERY Service Station is an all year business. To-day the owner drives his car in every kind of weather. He depends upon his Service Station to keep his battery in condition to start his cold stiff motor, to light his lights during long dark nights, to shoulder the responsibility of his ignition.

Battery service stations are profitable when they give service, for real service is the keystone to success. We want service stations in districts where we are not represented. If you are already handling a battery let us show you how you can increase your sales and profits. If you are not, let us tell you how we will help you go into the battery business.

Write us today for the station in your city.

BOICE PERRINE CO., Boston
New England Distributors

U. S. LIGHT & HEAT CORP., Niagara Falls, N. Y.

Branches in New York, Detroit, Chicago, Kansas City,
San Francisco, Washington, D. C.

YOUR BATTERY REQUIRES SPECIAL WINTER CARE

WE GIVE YOU FREE
Inspection, testing, filling, advice.
Get the habit—Come weekly.

If you lay up your car
**LEAVE YOUR
BATTERY WITH US**

We guarantee it will give you service next
spring and all summer. Cost to you is small.
(Name and Address of Service
Station here.)



U-S-L Service Stations are displaying this sign now
—Garages and Dealers will do well to have their cus-
tomers heed this advice.



RAYFIELD
CARBURETORS

Proof of the Pudding

The big closing punch in the sale of an automobile is the demonstration.

The Rayfield is made to make good in service; if it doesn't live up to your and our guarantee of 20% to 50% more miles per gallon of gasoline with better all-round performance—then the man gets his money back.

Right now is the time to consider the Rayfield—winter—when a carburetor demonstrates its superiority most effectively.

The Rayfield meets any situation in all-weather driving; it stays adjusted.

Write us about our special sales proposition to dealers.

FINDEISEN & KROPP MFG. CO.
2127 Rockwell Street, Chicago.

BOICE PERRINE COMPANY
BOSTON, MASS.
New England Distributors.

Universal Motor Truck Accounting System \$10.00

Will buy a complete, practical system that any one can operate and which contains all forms needed for one year.

THE SYSTEM INCLUDES:

350 Day Cards
1 Day Card Carrier
1 Annual Record Book

From these data, operating costs and earnings can be obtained in a few moments. Any clerk can keep the records of one or 100 trucks.

MOTOR TRUCK

Times Building

Pawtucket, R. I.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Announcing The New A.C. Carbon Proof Spark Plug

Here is the first plug made which will not accumulate carbon! It will permanently rid motorists of that trouble which has been their bugbear in the past.

This New AC has been tested for a year on a number of cars and tractors using both gasoline and kerosene in which ordinary plugs would "soot up" rapidly. The perfect results obtained by this new AC have exceeded our highest expectations.

At Last Ford, Overland and Studebaker owners—this is the plug you have wanted to keep your motors hitting on all cylinders all the time.



Price \$1.00

The Reason

A deposit of carbon on the smooth surface of the porcelain is what causes short circuit. In this new AC plug the carbon proof porcelain is provided with a number of ribs having saw tooth edges. These attain a sufficiently high degree of heat to burn away the carbon thereby keeping the edges free from deposits and breaking up any possible short circuit.

Dealers: To secure your share of AC Carbon Proof business, order now and be sure of quick delivery.

AC *The Standard Spark Plug of America*

CHAMPION IGNITION COMPANY
Sole Manufacturers Flint, Michigan

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Maxwell Bros.

**SELL THEM ALL ON
AUTO PARTS
FOR ALL MODELS AND MAKES OF
AUTOMOBILES**

Get Our Prices Before You Buy and
SAVE MONEY.

We guarantee all articles bought from
us to prove satisfactory. If not re-
turn them and we will refund money.

WE HAVE

a great stock of complete rear axles,
complete motors, transmissions, trans-
mission cases, crank cases, crank
shafts, disc clutches, transmission
gears, bearings, axle shafts, cylinders,
cam shafts, radiators, connecting rods,
magnetos, coils, carburetors, wheels,
hubs, rims, springs, etc., at 50 to 75 per
cent. off the manufacturers' list price.

Write or Wire Us Your Wants.

Maxwell Bros.

3932 Olive Street, St. Louis, Mo.

We Carry the Largest Stock of

AUTO PARTS IN AMERICA

We furnish parts at a saving of

50 to 80%

Off Manufacturers' Price List.

If you're in a hurry just take your
parts book of your car and deduct one-
half of the price in there and write,
wire or 'phone us the order. We will
ship parts the same day your order is
received. Special discounts to dealers.

GEARS

We have just received a shipment con-
taining EIGHT TONS of GEARS for all
standard makes of cars. Send us your
old gears and let us match them.

**Big Bargains in Motors, Parts,
Accessories.**

Every garage and repair man should
have our new catalogue.

THE HOUSE RELIABLE.

THE AUTO PARTS CO.

4100 Olive St., St. Louis, Mo.

MAXWELL } DEALERS METZ

We carry at all times a full and com-
plete stock of.

Atwater Kent Parts.

We are also manufacturer's agents for
the

Walden-Worcester Wrenches.

Write for our Price List.

ATWATER KENT SALES CO.

883 Boylston St., Boston, Mass.

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A High Class Car At a Surprising Price

Looks like a thoroughbred, with its long, slender, graceful lines, and high hood! And what's more, it is a thoroughbred. It's been a mighty good car during nine years of steady improvement.

In the language of your tailor, each Empire car is "custom-made," not "ready-made."

It is a big, handsome, roomy car of remarkable easy riding quality with every mechanical detail perfected and every item of up-to-date equipment provided.

Every detail of the chassis measures up to its six cylinder Continental motor. The Empire gives you a real value not approached by any other car in its price class.

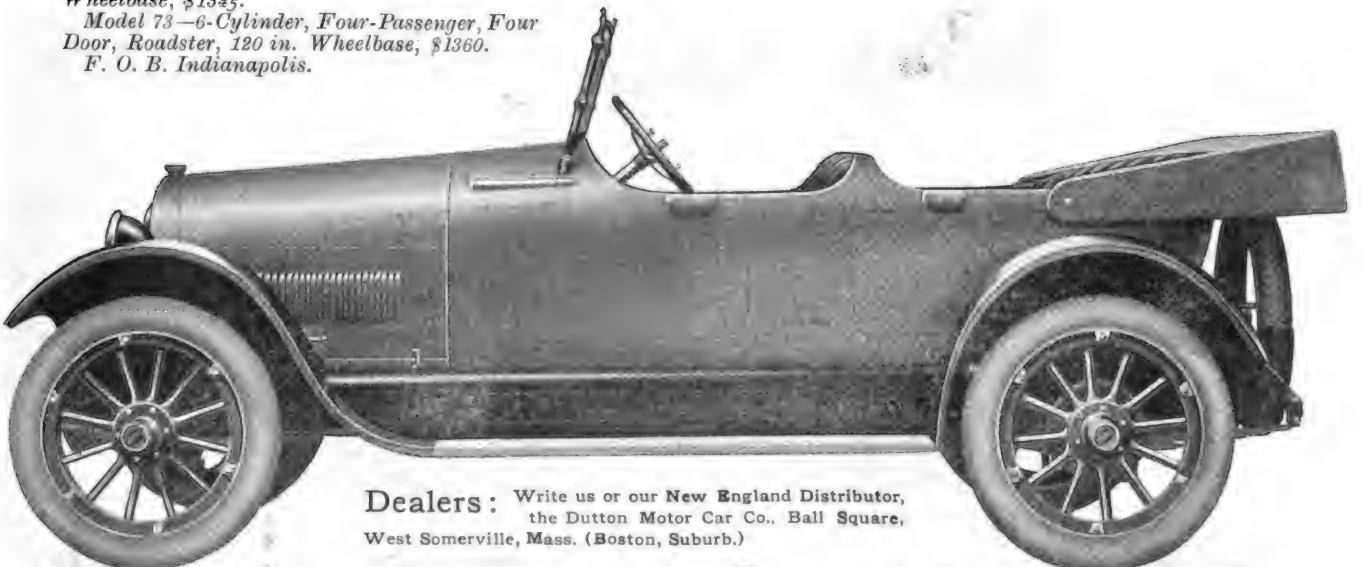
\$1125 to \$1360

Model 50—4-Cylinder, Touring, 115 in. Wheelbase, \$1125.

Model 51—4-Cylinder, Two-Passenger, Roadster, Wire Wheels, \$1165.

Model 70A—6-Cylinder, Touring, 120 in. Wheelbase, \$1345.

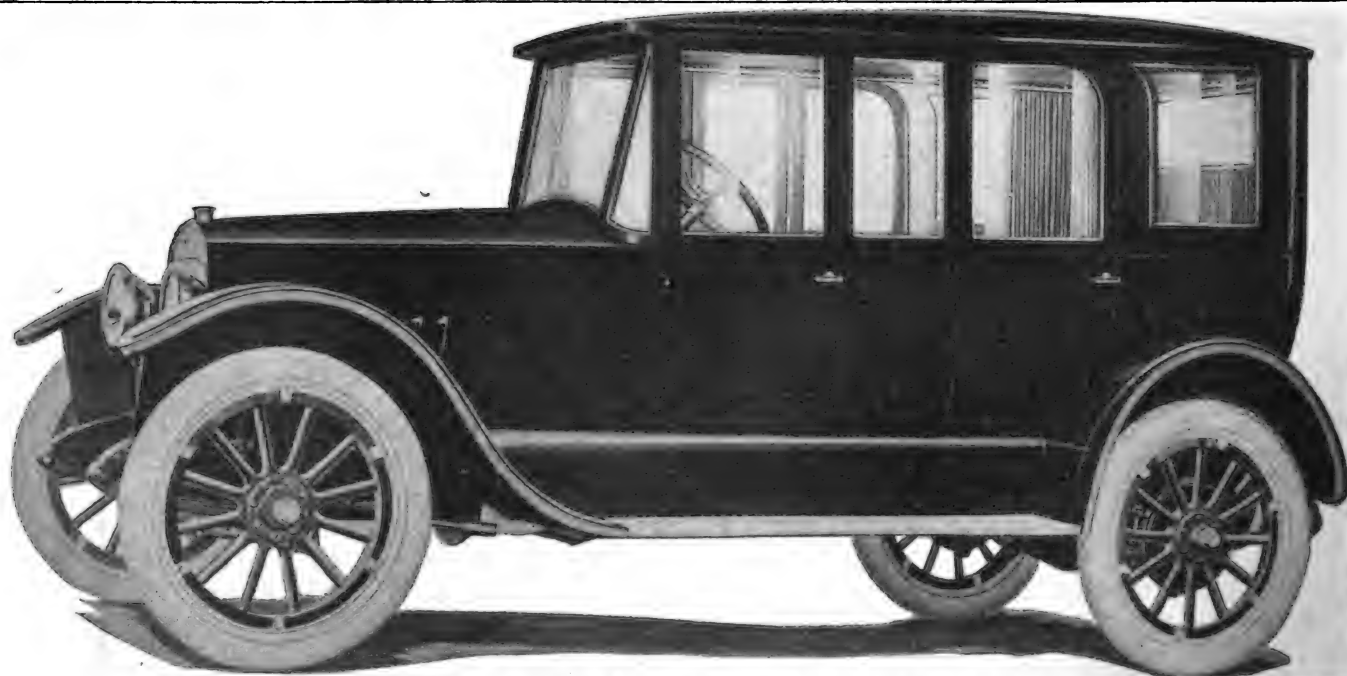
*Model 73—6-Cylinder, Four-Passenger, Four Door, Roadster, 120 in. Wheelbase, \$1360.
F. O. B. Indianapolis.*



Dealers: Write us or our New England Distributor, the Dutton Motor Car Co., Ball Square, West Somerville, Mass. (Boston, Suburb.)

Empire Automobile Co., (Established 1908) Indianapolis, U.S.A.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



HACKETT

Ultra-Four

A PRIDEFUL CAR, DISTINCTIVELY DIFFERENT

WITH

Durability, Style, Finish and a Popular Price

WHICH

Stimulates a Desire for Possession

BUILT BY

HACKETT MOTOR CAR CO.

JACKSON, MICH.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

THE Automobile Journal

LXIV.

DECEMBER, 25, 1917.

NO. 10.



The illustration depicts a woman in classical attire, possibly representing Victory or Liberty, holding a sword and a laurel wreath. She is standing in front of a large, ornate archway. Through the archway, a car show is visible, featuring various automobiles on display. The background is filled with stars. At the bottom of the illustration, there is a cityscape with buildings and a large, stylized letter 'G'.

Great New York Show

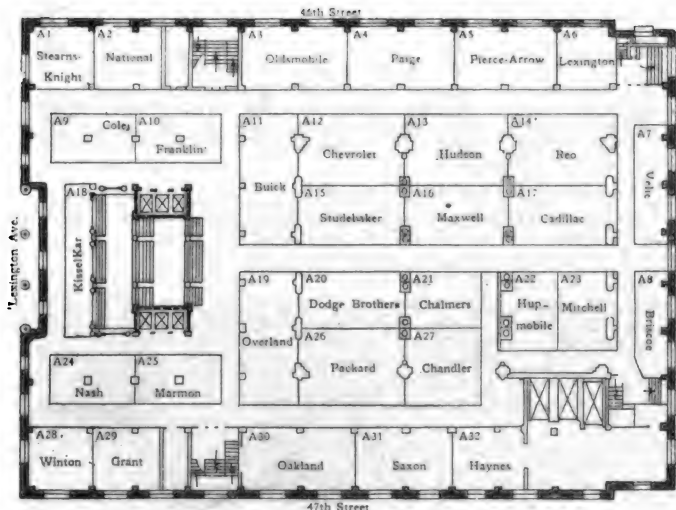
Grand Patriotic Display Marks Motor Industry's Resources

THE 18th annual National Automobile Show, the biggest event throughout the world in motordom, opens at the Grand Central Palace, in New York City, on Saturday, Jan. 5, with over 400 of America's latest car creations on exhibition and approaching 300 exhibitors of accessories and parts. Several millions of dollars worth of products will be on display throughout the week, and while it is the first show ever staged by the industry while the country is engaged in a big war, it will be as comprehensive and interesting as any of the previous ones. There are more exhibitors than ever before and every bit of floor space in the mammoth four-story structure has been taken and will be used for exhibition purposes.

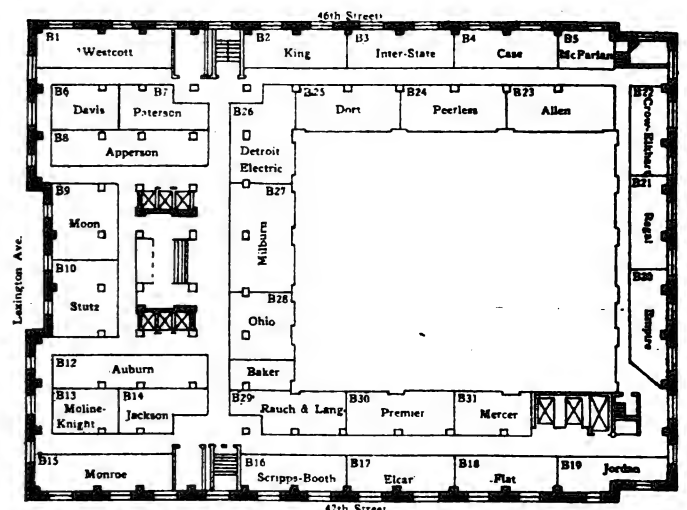
The National Automobile Chamber of Commerce under whose auspices the show is held, has earned an enviable reputation for its resourcefulness, and, in presenting its 1918 show on an unprecedented scale, establishes not alone the solidity of the industry, but that the members have the

VICTORY

G. Sautcher



Main Floor Grand Central Palace, Car Exhibits.



Second Floor Plan, National Automobile Show, Cars.

courage of their convictions of the industry's ability to ride out the period of war without suffering a setback.

In all 86 American car manufacturers are represented, including makers of steam and electric passenger cars. Jan. 8 will be observed as Army and Navy day. Wednesday, Jan. 9, will be Society day. Thursday will be observed as S. A. E. day. The annual dinner of the Motor and Accessory Manufacturers' Association will be held at the Waldorf on the evening of Jan. 9 and many other functions of an auxiliary nature to the show will be held during the week.

A patriotic scheme of decorations symbolizes the national spirit, as well as the wholehearted and active participation in the war of the motor car industry. S. A. Miles, manager of the show, has been directing the creation of the hundreds of designs and tapestries that will make up the decorative scheme from the flags of the Allies and the Stars and Stripes.

DETAILS OF THE CAR OF 1918.

Not including the exceptions which establish the rule, the 1918 motor car is an embodiment of the principles and practises of the past several years with numerous minor refinements and improvements. It is a bigger car in length and proportions, has more power and costs considerably more. While last year about 10 per cent. of the models were priced at less than \$750, less than six per cent. are priced below that figure this year. Only 21 per cent. of this year's models list at less than \$1000, while last year nearly 28 per cent. sold below that figure. A year ago about 53½ per cent. of the models were priced between \$1000 and \$2000, while this year only 49 per cent. are in-

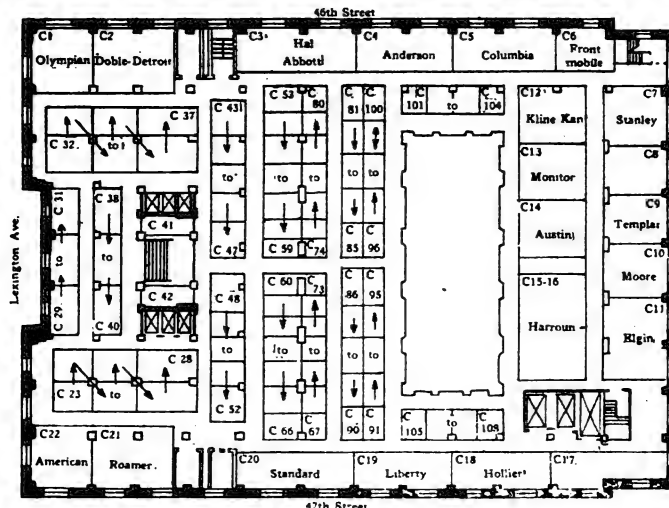
cluded in cars covered by that range of price.

On the other hand it can be operated more economically and has greater service value as a result of devices adopted for securing more power from a given

lighter, yet are better constructed and have many innovations, including additional appointments in the way of panels, lockers and other features, which while used in some models in the past are now quite general on enclosed types.

Fewer makes are listed this year. In the tabulation of specifications on pages 29-41 of this issue, 149 makers of gasoline cars are listed as compared with 185 in last year's table. Careful numerical deductions show there is a definite tendency this year in favor of the six-cylinder car, which shows 44.9 per cent. of the whole, as compared with the four-cylinder, 38.9 per cent., and that the multi cylinder types, including the eight, 12 per cent., and 12-cylinder cars, four per cent., have about the same relation to the total of makes as they did last year.

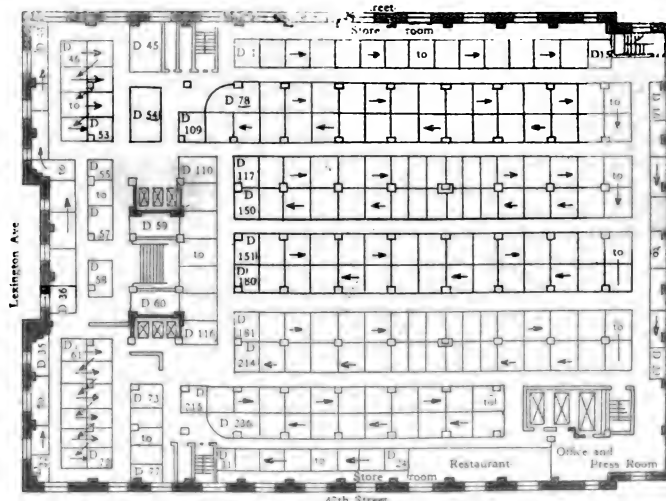
Over 80 per cent. of the makes this year are either ½ elliptic, ¾ elliptic or cantilever spring suspension, and this proportion is about the same as it was last year, but there is a decided tendency shown this year in favor of the ½ elliptic, this type being used on 38.7 per cent. of the makes, while last year it was used on 35.5 per cent. The ¾ elliptic type, which was used last year on 27.8 per cent. of the cars, is used on only 24.2 per cent. this year, while the cantilever is used this year on 29 per cent. of cars, as against 27.8 last year. These figures show a notable gain in popularity for both the ½ elliptic, as well as cantilever, over the ¾ elliptic type. Five listed cars are using the elliptic type this year, the Franklin, Jackson, Metz, Dispatch and Briscoe, as compared with nine last year. The Packard, which was formerly equipped with this type, has adopted the ½ elliptic suspension. There are



Third Floor Plan, Showing Car and Accessory Booths.

quantity of fuel and for using a cheaper grade of fuel. This includes improvements in carburetion and automatic controls by the thermostat.

Many novelties will be seen in the coach work. Bodies are being made



Fourth Floor, All Spaces Devoted to Accessories.

four special types of spring suspension this year, three semi-cantilever and three using the platform.

There is a marked trend again this year in favor of the ignition systems of the secondary distributor type. Figuring on a basis of 149 makes of cars this year, as compared with 185 in last year's specifications, the number of models using this type is the same for both years, totaling 98; while magneto ignition systems are found on 75 models this year as compared with a total of 101 cars last year. Remy, which was used on 37 models last year, is on 36 this year. Delco is used on 34 models this year as against 26 last year. Atwater Kent is on 22 models this year, as against 18 makes last year. Connecticut is on 31 cars this year as against 34 last year, and the Bosch system is used on 21, as against 31 last year. Dixie is used on six models, as against 11 last year. Westinghouse ignition, which was on 14 cars last year, is returned as on six models this year.

The average wheelbase length of all cars is practically the same, about 120 inches, with a slight tendency to longer wheelbases on the medium priced and high priced cars. The Trumbull has the shortest wheelbase listed this year, 80 inches, while the Pierce-Arrow presents the longest, 147½ inches.

The specifications also disclose an increased piston displacement, more valve in head motors and more equipment.

The specifications also disclose an increase in the touring car or chassis price in the specifications, is \$2359, as compared with \$1881 last year figured on prices as listed then. This average advance of \$478 seems too large, but is not when the advance in prices on the six, eight and 12-cylinder models are taken into consideration. The average price of a four-cylinder car, as shown by this year's list, is \$1549, an increase of \$108 over last year's average price of \$1441. On six-cylinder models, however, an advance of \$453 is shown in the average price, this year's figure being \$2270, as compared with \$1817 last year. Even a greater advance is shown in the higher priced cars, as would be expected, the average price of an eight-cylinder car this year being \$2380, as compared with \$1723 last year, an increase of \$657. On the 12-cylinder cars the average price has increased from \$2545 last year to \$3240, an increase of \$695.

The Accessory Exhibitors List

A-B-C Starter Co., Detroit, Mich.
Adams Williams Mfg. Corp., N. Y. City.
Adamson Mfg. Co., East Palestine, O.
Advance Auto-Accessories Co., Chicago, Ill.
Alexander Mfg. Co., J., New York City.
Amazon Rubber Co., Akron, O.
American Chauffeur Pub. Co., Cincinnati, O.
American Bronze Co., Berwyn, Pa.
American Ever Ready Works, L. I. C., N. Y.
American Express Co., New York City.
American Sleeve-Valve Motor Co., N. Y. C.
Anderson Forge & Machine Co., Detroit, Mich.
Armstrong Cork Co., Pittsburgh, Pa.

(Continued on Page 55.)

New York Show Car Exhibitors

(See Diagrams on Opposite Page.)

Following is a list of the cars that will be exhibited at the National Automobile Show at the Grand Central Palace, New York, during the week of Jan. 5-12:

Floor	Space	Car Name	Maker	Address
3d	C 3	Abbott-Detroit	Abbott Corporation	Cleveland, O.
2nd	B 24	Allen	Allen Motor Company	Fostoria, O.
3d	C 22	American	American Motors Corporation	New York
3d	C 4	Anderson	Anderson Motor Company	Rock Hill, S. C.
2nd	B 8	Apperson	Apperson Bros. Automobile Co.	Kokomo, Ind.
2nd	B 12	Auburn	Auburn Automobile Co.	Auburn, Ind.
3d	C 14	Austin	Austin Automobile Co.	G. Rapids, Mich.
2nd	B 29	Baker	Baker R. & L. Company	Cleveland, O.
1st	A 8	Briscoe	Briscoe Motor Corporation	Jackson, Mich.
1st	A 11	Buick	Buick Motor Company	Flint, Mich.
1st	A 17	Cadillac	Cadillac Motor Car Co.	Detroit, Mich.
2nd	B 4	Case	J. I. Case T. M. Company	Racine, Wis.
1st	A 21	Chalmers	Chalmers Motor Company	Detroit, Mich.
1st	A 27	Chandler	Chandler Motor Car Company	Cleveland, O.
1st	A 12	Chevrolet	Chevrolet Motor Company	New York
1st	A 9	Cole	Cole Motor Car Company	Indianapolis, Ind.
3d	C 5	Columbia	Columbia Motors Company	Detroit, Mich.
2nd	B 22	Crow-Elkhart	Crow-Elkhart Motor Company	Elkhart, Ind.
2nd	B 6	Davis	Geo. W. Davis Motor Car Company	Richmond, Ind.
2nd	B 26	Detroit Electric	Anderson Electric Car Company	Detroit, Mich.
3d	C 2	Doble-Detroit	Doble-Detroit Steam Motors Co.	Detroit, Mich.
1st	A 20	Dodge Brothers	Dodge Brothers	Detroit, Mich.
2nd	B 26	Dort	Dort Motor Car Company	Flint, Mich.
3d	C 11	Eigin	Eigin Motor Car Company	Chicago, Ill.
2nd	B 17	Elcar	Elkhart Car. and Motor Car Co.	Elkhart, Ind.
2nd	B 20	Empire	Empire Automobile Company	Indianapolis, Ind.
2nd	B 18	Fiat	F. I. A. T.	Poughkeepsie, N. Y.
1st	A 10	Franklin	H. H. Franklin Mfg. Co.	Syracuse, N. Y.
3d	C 6	Frontmobile	Camden Motors Corporation	Camden, N. J.
1st	A 29	Grant	Grant Motor Car Corporation	Cleveland, O.
		Hackett	Hackett Motor Car Company	Jackson, Mich.
3d	C 3	Hal	Hal Motor Car Company	Cleveland, O.
3d	C 15-16	Harroun	Harroun Motors Corporation	Detroit, Mich.
1st	A 32	Haynes	Haynes Automobile Company	Kokomo, Ind.
3d	C 18	Hollier	Lewis Spring and Axle Company	Chelsea, Mich.
1st	A 13	Hudson	Hudson Motor Car Company	Detroit, Mich.
1st	A 22	Hupmobile	Hupp Motor Car Corporation	Detroit, Mich.
2nd	B 3	Inter-State	Inter-State Motor Company	Muncie, Ind.
2nd	B 14	Jackson	Jackson Automobile Company	Jackson, Mich.
2nd	B 19	Jordan	Jordan Motor Car Company	Cleveland, O.
2nd	B 2	King	King Motor Car Company	Detroit, Mich.
1st	A 18	Kissel-Kar	Kissel Motor Car Company	Hartford, Wis.
3d	C 12	Kline Kar	Kline Kar Corporation	Richmond, Va.
1st	A 6	Lexington	Lexington-Howard Company	Connorsville, Ind.
3d	C 19	Liberty	Liberty Motor Car Company	Detroit, Mich.
1st	A 25	Marmon	Nordyke & Marmon Company	Indianapolis, Ind.
2nd	B 5	McFarlan	McFarlan Motor Company	Connorsville, Ind.
1st	A 16	Maxwell	Maxwell Motor Company	Detroit, Mich.
2nd	B 31	Mercer	Mercer Automobile Company	Trenton, N. J.
2nd	B 27	Milburn	Milburn Wagon Company	Toledo, O.
1st	A 23	Mitchell	Mitchell Motors Company	Racine, Wis.
2nd	B 12	Moline-Knight	Moline Automobile Company	E. Moline, Ill.
3d	C 13	Monitor	Monitor Motor Car Company	Columbus, O.
2nd	B 15	Monroe	Monroe Motor Company	Pontiac, Mich.
2nd	B 9	Moon	Moon Motor Car Company	St. Louis, Mo.
3d	C 10	Moore	Moore Motor Vehicle Company	Minneapolis, Minn.
1st	A 24	Nash	Nash Motors Company	Kenosha, Wis.
1st	A 2	National	National Mot. Car and Veh. Corp.	Indianapolis, Ind.
1st	A 30	Oakland	Oakland Motor Car Company	Pontiac, Mich.
2nd	B 28	Ohio	Ohio Electric Car Company	Toledo, O.
1st	A 3	Oldsmobile	Olds Motor Works	Lansing, Mich.
3d	C 1	Olympian	Olympian Motor Company	Pontiac, Mich.
1st	A 19	Overland	Willis-Overland Company	Toledo, O.
2nd	B 29	Owen Magnetic	Baker R. & L. Company	Cleveland, O.
1st	A 26	Packard	Packard Motor Car Company	Detroit, Mich.
1st	A 4	Paige	Paige-Detroit Motor Car Co.	Detroit, Mich.
2nd	B 7	Paterson	W. A. Paterson Co.	Flint, Mich.
2nd	B 24	Peerless	Peerless Motor Car Co.	Cleveland, O.
1st	A 5	Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.
2nd	B 30	Premier	Premier Motor Corporation	Indianapolis, Ind.
2nd	B 29	Rauch & Lang	Baker R. & L. Company	Cleveland, O.
2nd	B 21	Regal	Regal Motor Car Company	Detroit, Mich.
1st	A 14	Reo	Reo Motor Car Company	Lansing, Mich.
3d	C 21	Roamer	Barley Motor Car Company	Kalamazoo, Mich.
1st	A 31	Saxon	Saxon Motor Car Corporation	Detroit, Mich.
2nd	B 16	Scripps-Booth	Scripps-Booth Corporation	Detroit, Mich.
3d	C 20	Standard S.	Standard Steel Car Corporation	Pittsburgh, Pa.
3d	C 7	Stanley	Stanley Motor Carriage Company	Newton, Mass.
1st	A 1	Stearns Knight	F. B. Stearns Company	Cleveland, O.
1st	A 15	Studebaker	Studebaker Corporation	South Bend, Ind.
2nd	B 10	Stutz	Stutz Motor Car Company	Indianapolis, Ind.
3d	C 9	Templar	Templar Motor Corporation	Cleveland, O.
1st	A 7	Velle	Velle Motors Corporation	Moline, Ill.
2nd	B 1	Westcott	Westcott Motor Car Company	Springfield, O.
1st	A 19	Willis-Knight	Willis-Overland Company	Toledo, O.
1st	A 28	Winton	The Winton Company	Cleveland, O.
		Woods	Woods Motor Vehicle Company	Chicago, Ill.

Owners' Service Now An Institution

Boice-Perrine Co., New England Distributor of Six Specialties,
Affording It Through 100 Agencies and Its Own Big Boston Plant

DISTRIBUTING six of the best known equipment specialties of the motor vehicle industry, and maintaining specially developed service organizations throughout New England, the Boice-Perrine Co., with general offices, service stations and warehouse at 48-52 Cummington street, Boston, and a branch at Springfield, Mass., operates a business that is as unique, when compared with the operations of other distributing firms, as it is progressive.

The company is the sales representative in New England for Findelsen & Kropf Manufacturing Co., Chicago, manufacturer of Rayfield carburetors; United States Light and Heat Corporation, Niagara Falls, N. Y., manufacturer of USL storage batteries for starting and lighting systems; the Dreadnaught Tire and Rubber Co., Baltimore, Md., manufacturer of Dreadnaught pneumatic tires; Castle & Kyte, Detroit, distributor of Hayes wheels, built by the Hayes Wheel Co., Jackson, Mich.; for A. J. Picard & Co., New York City, distributor of Genemotor starters for Ford cars. It is also distributor of Vulcan springs, made by the Jenkins-Vulcan Spring Co., St. Louis, Mo., and it sells some supplies that are used in connection with Genemotor starters, Rayfield carburetors and USL batteries, but the last mentioned are incidental and are sold largely for the convenience of some of its customers. Quite separate from the operations stated the company operates an electrical supply business, this being principally with construction material that is used by public service companies and by concerns that operate their own electric lighting or power plants. One will understand that this has no relation with the use of power vehicles, and for that reason will not be considered in this statement.

The company has made remarkable progress because of its policies and its methods and it is today one of the largest concerns of the kind in the country, and the purpose is to continue this development wherever conditions in New England appear to justify. It was established in July, 1913, to operate a retail accessory, equipment and supply business in Boston, and a store at 601 Boylston street, then a thorough-

fare in which a considerable number of automobile agencies and accessory and distributing concerns were operating, was believed to be sufficient to meet all requirements. At first the business was largely transient and purely local, and shortly attention was given to owners' service that was particularly attractive to Bostonians. Later on a shop in Harcourt street was occupied and equipped with stock and tools to serve the company's customers, as the demand for space could not be met in the store premises.

The company then began distribution of equipment, supplies and accessories in Boston and vicinity that it could control more or less exclusively, and dealt with a number of specialties in addition to its retail business. Later on the original store was found inadequate and removal was made to 64 Brookline avenue, the supposition being that this would afford all expansion needs for a considerable period at least. The growth of the business was especially rapid after removal, the activities of the company being directed to development of the distribution of accessories, equipment and supplies in a considerably increased zone.

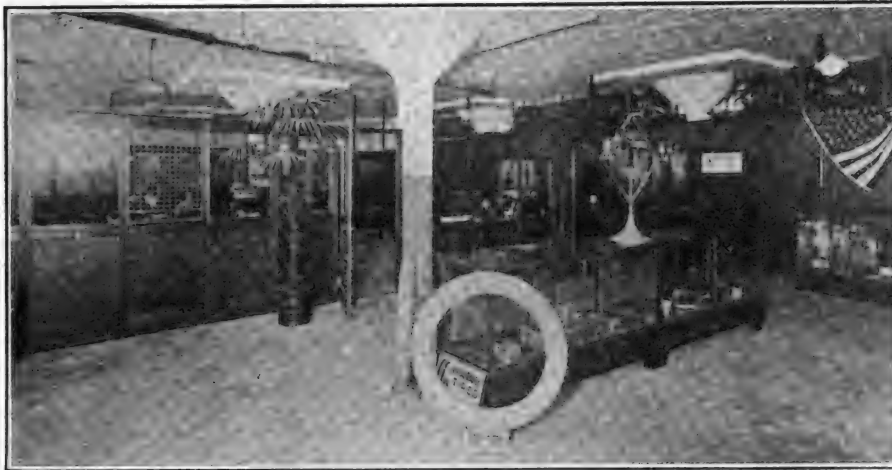
Contracts Made as Distributors.

In February, 1916, the company made contract to distribute USL batteries throughout New England. The company had previously made a similar contract with the manufacturer of Rayfield carburetors, and it was also distributing Genemotor starters, manufactured by the General Electric Co., in New England territory. Since that time it has also made distributing contracts for the sale of Dreadnaught tires and Hayes wheels. Of course the development of a sales organization required time and a great deal of careful study for requirements with reference to each particular product varied, and in rare instances could a single individual have agency for all of them.

The Generator, which is constructed for installation on Ford cars, might, for instance, be sold through any Ford dealer who could install it, as demand might originate with Ford car agents in a community of considerable size, and



The Plant of the Boice-Perrine Co., in Cummington Street, Boston, Which Is Specially Equipped for Owners' Service for USL Batteries, Genemotor Engine Starters, Rayfield Carburetors and Hayes Wheels.



Section of the Sales Rooms and a Corner of the Offices, Which Occupy a Comparatively Small Section of the Second Floor.

exclusive agency in a good sized city might be restrictive rather than developmental. There was belief, founded upon experience, that exclusive service stations would not be as productive of business as a plan of selling such as has been stated, for Genemotors could be supplied as the orders were received and there was not the urgent need that was obvious with other products. One of the main objects was to establish the company as the distributor of Genemotors in New England and to have the knowledge generally obtaining that it was prepared to fill orders immediately and by reliable means of delivery.

The Rayfield carburetor, however, needs be handled by agents who are specialists in carburetion, who are well versed with theory and practical knowledge, who can install these instruments and adjust them so that large fuel economy and engine efficiency can be obtained, who can advise users and suggest how existing conditions can be advantageously changed. Good carburetor men are generally good automobile engine men, because a good knowledge of one cannot be obtained without much practical experience with the other, and the combination of the two is the rule rather than the exception. For this reason salesmanship is not the only essential for successful management of a carburetor service station, and there is some reason to consider location with reference to the number of motorists who may be possible users.

Because lighting and starting systems are almost universal equipment of all automobile passenger cars, and many machines used for several years have been equipped with such systems, a battery service agency is located with a view of convincing the largest number of owners in any given section, the expectation being that motorists will require service so long as they own and operate machines. The electric systems of motor cars must be absolutely dependable and batteries are a vital necessity with either lighting or starting or combination equipment. Because cars are so universally equipped with batteries these are also the sources of ignition current supply, and for this reason the statement that battery service is even more important than any other is not overdrawn. The battery service is not merely carrying a stock of batteries of different types and sizes to make renewals and replacements, but it means charging and discharging, disassembling and repairing or restoring the cells to the highest practical efficiency.

Batteries are shipped by manufacturers in probably the best condition of any equipment installed in power vehicles, from the fact that they must be developed or "formed" to definite standards, the results being ascertained by positive tests

and checking so that there is little possibility of a defect escaping inspection. The cells must show actual capacity when charging and discharging, and when incapacity is evidenced special charging treatments and varying tests determine the causes very clearly, so that there is accurate knowledge of any unit and there is little probability of it failing to meet service requirements.

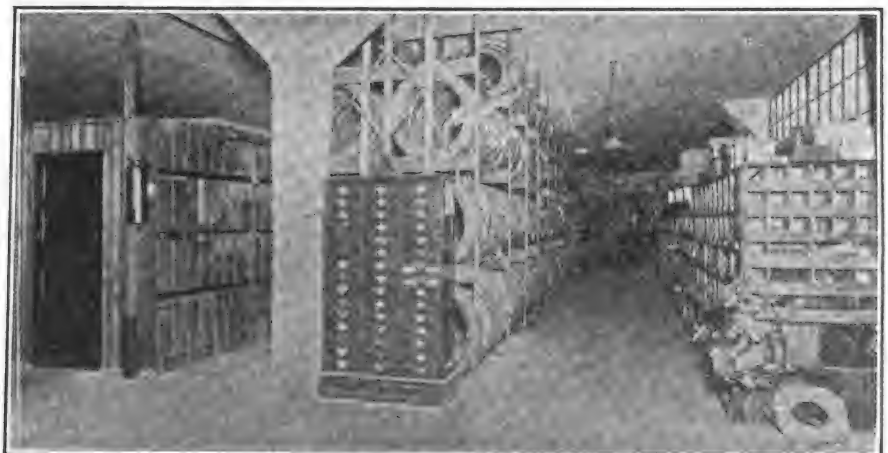
Batteries are extremely serviceable and reliable so long as they are given systematic attention. A precise formula for replenishing water dissipated by charging, or for renewing electrolyte at varying intervals, may serve ordinarily, but this must be supplemented by treatment for renewing potency when reduced from continued undercharging or sulphation or some condition resulting from overcharge or inactivity, and in addition to this there is need of restoration

by replacing broken cells, damaged plates, fractured terminals or straps, or other repairing which cannot be done by the individual owners. Cells that are inactive from varying causes may be restored to excellent efficiency by careful treatment by experienced battery men, for comparatively small expense.

A battery service station must be equipped with charging apparatus that can be operated with a considerable number of cells, for charging or "treating" individual cells, for lead burning, and a sufficient stock of jars, wood and rubber separators and positive and negative plates, and other parts that are necessary in repairing, and it must have available the service of at least one man who has experience with charging and making repairs of all kinds. One will understand that a station of this kind entails a considerable investment and a reasonable expectation of business for any one to engage in operating it, and it must be well known to motorists to have such patronage as would make it profitable.

This statement is desirable to inform the reader that the battery service station is a business that cannot be engaged in merely through the investment of capital alone, for custom to a considerable extent will depend upon the battery sold or handled, although there is no reason why other makes of batteries cannot be given equally good attention.

The Bolce-Perrine Co. after making contract with the United States Light and Heat Co., established its own service station, equipped to meet every demand upon it by owners, installed a stock of batteries of all sizes and types used for starting and light systems, and all components needed for making repair and restoration, the purpose being to serve its own customers and to have a sufficient reserve to supply subsidiary service stations wherever these might be located. A systematic campaign was begun to establish USL stations in the New England states, each to afford service that would



One of the Aisles of the Stock Room Seen from the Packing Room, the Centre Section Being Given Over to Storage of Pneumatic Tires.



The Mid-Section of the Floor of the Department Affording Service for Genemotor Starters, Rayfield Carburetors and Hayes Wheels.

measure up to the standard of the company. This was carried out very successfully and the company has today no less than 30 stations outside of its own in Boston.

Tire and Wheel Distributing Systems.

Upon making contract to distribute Dreadnaught tires the company sought to have agencies where the best of service could be given owners, and where full stocks could be carried to meet every demand that might be made upon them. The company must have a large stock of casings and tubes of all sizes to maintain the stocks of its agencies, as well as meeting the local demands.

The Hayes wheel distributing contract was recently made and no organization for systematic sales has been completed, but the purpose is to establish stations where the wheels can be installed and owners will have the same character of attention afforded for batteries, carburetors and tires. The company devotes all its organization upon these six specialties, and, of course, oversight of the different agencies representing it. There are upwards of 30 Rayfield carburetor agencies, more than 30 USL battery service stations and 40 Dreadnaught tire agencies, or a total of approximately 100, few of which are operated as combinations. This will be considerably increased as the Hayes wheel stations are established.

The policy of the Boice-Perrine Co. is to be constantly in touch with these service stations through its own selling organization, and in addition to this the Rayfield carburetor manufacturers have two carburetor experts constantly in New England whose services are at the disposal of the stations to advise owners and to make adjustments. The object is to afford whatever degree of attention is desirable to insure entire satisfaction, not only with carburetors, but with all other equipment, and the service is augmented and developed as conditions justify.

The specialty distribution and the service demands in Boston become so large that the company during the autumn had constructed a building in Cummington street purposely for service station purposes, and occupied it Oct. 1. The structure is of concrete, steel and stone. The location is central in the automobile section of the city, being just off Commonwealth avenue and convenient of access from all of the main motor thoroughfares.

The building is two stories and basement, fireproof and splendidly lighted. The company has floor space of approximately 20,000 square feet, or nearly a half acre.

The basement is given over to the Genemotor, Rayfield carburetor and Hayes wheel service department, and it is laid out so that there will be the larg-

est practical floor area for placing cars on which work is progressing. Along one side of the floor is a work bench that is admirably lighted by large windows, and at the other side are the lathes and other machine tools necessary, the greater part of the floor being clear. A stock room and tool room, located in one corner and well lighted by windows, is equipped with parts of all kinds for Genemotors, carburetors and wheels, and there is an elevator large enough to take a passenger car of large size with lifting capacity of four tons. With this a small delivery truck can be taken directly into the stock room on the upper floor for unloading, so that one handling is sufficient, or a machine may be loaded in the stock room, taken down and driven out.

The first floor is the USL battery service station, and this is divided into an office and waiting room, a repair and charging room, a stock room and a storage floor that will accommodate about 15 cars. The office is for this department only and the records are kept separate from the general accounting of the company. The stock room is large and in it is carried parts of all kinds for all types and sizes of USL cells used for motor vehicle equipment. It has ample bench room for cell and battery disassembly and assembly for repairing, charging panels adapted for any number of cells up to the voltage limitations for either treatments or charging, with lead burning apparatus and tools necessary for battery work. It has all instruments needed for tests and experiments for both board and hand work.

A considerable stock of batteries is carried so that exchanges may be made for batteries brought in for repair or recharging, that cars may be used, and these are some times rented as well. In this department work is done for the regular customers or for transients, as well as for any of the service stations that may send batteries to the company that cannot be repaired or restored by them. In connection with the stock room is the shipping and receiving department. The battery station is open continuously because of the need of service at all times. While USL batteries are specialized, work on other batteries is done as required. This department is constantly growing and the demands upon it are very large.

On the second floor are the general offices, a sales room where display is made of the different specialties handled by the company, and the stock room in which are large stocks of Dreadnaught tires and tubes of all sizes, Rayfield carburetors and fittings, and Hayes wheels and parts and where these are also packed and shipped. This room can be considerably increased in the event of need by changes that are practical and which will not restrict the offices and sales rooms.



The Charging and Repairing Room of the USL Battery Service Division, Which Occupies an Entire Floor of the Station.

Show Modes for Motoring North and South

By MRS. A. SHERMAN HITCHCOCK.

AT NO time of the year does society so show its stamina as during the week of the Motor Show. Whether the day is good or bad, mild or cold, wet or dry, the smart set are in attendance.

The motor show woman does not attend in elaborate costume, except on "Society night," when some very stunning gowns are worn, but during the afternoons and other evenings smart, but practical clothing is the vogue. Furs are greatly in evidence of course. The large majority of motorists go to and from the show in their cars; hence their attire is characteristic of the sport. The open cars bring gay parties of women bundled in furs of all descriptions, from the richest of sable and ermine to the least expensive of pony and nutria. The enclosed cars bear a gorgeous freight of beautiful women with the loveliest of motor wraps and the most charming of gowns, and as they move about the different exhibits they display in their choice of raiment all that is newest and smartest in this particular class of clothing.

Dwellers in the North may shiver as they pass the shop windows where the promise of the spring time holds forth, albeit the thermometer is low, the mercury coquetting around the freezing point most of the time, and the north winds blowing keenly. In the rooms of



UPPER GROUP ILLUSTRATIONS.

Left: The "Polly Stole" made of crushed plush and trimmed with large silk tassels at each end. This stole may be brought around the neck, crossing in front, and is warm and becoming. The motor hat is of velvet, trimmed with a tassel at the side. Courtesy New York Manufacturing Co., New York City.

In the Centre is one of the smartest of coats for the motorist. It is made of muskrat and is trimmed with a wide border, collar and cuffs of the same fur. Courtesy William Jackman's Sons, New York City.

Right: The Fur Coatees are in very strong for the motorist and will be worn very late into the Spring. This smart model of Hudson seal is made to hang full from the shoulders, but has cuffs at the sides for the hands. Courtesy E. Albrecht & Son, St. Paul, Minn.

Below: Here is one of the very newest of models which will be in evidence at Palm Beach in the near future. This pliant and becoming veil will not tear or stretch. Courtesy E. & Z. Van Raalte, New York City.

LOWER GROUP ILLUSTRATIONS.

Left: For many of the enclosed car is built this beautiful set of ermine, wonderful in its quality and unusual in its protectiveness. The manufacturer of fur garments keeps the society woman's needs well in mind, and for the opera, theater or "Society Night" at the Motor Show what could be more appropriate or charming than beautiful furs of this character? Courtesy C. C. Shayne & Co., New York City.

Centre: When the motor woman accepts an invitation to a smart evening affair her fur coat covers a gown of this character. In this creation, made of satin millaire and generously beaded, she presents just the correct appearance. Posed by Mrs. Vernon Castle. Copyright, Ira L. Hill, 1917. Courtesy Corticelli Silk Mills, Florence, Mass.

Right: This Charming Motor Frock is made from our beloved Jersey cloth and soutache braided. This model happens to be in gray, with braiding of the same tone.





Isn't This Palmer Garment Coat a stunning model for the youthful motorist? Just the right kind to wear over the sweater or suit, or with which to wear the fur neckpiece. The collar is convertible and may be brought up around the neck in a protective manner, and aren't the pockets the very thing in which to carry the veil and gloves? Made of sports cloth in all shades. Courtesy Percival B. Palmer & Co., Chicago, Ill.

the designers where motor garments are built, one might well imagine that the sunny days of May had arrived, for the raiment for motoring for southern wear is to be seen and the favored motorists who travel South at this season of the year display strong interest in the charming manifestations that can now be seen.

Our American Riviera, as the east coast of Florida has come to be known, begins to awaken to life about the middle of January and the huge hotels that are dotted along the coast from Jacksonville down to Miami are thronged with tourists from all parts of the country, who come to escape the dreary northern winter, and a very large percentage of these tourists are accompanied by their motor cars, for outdoor life leads the fashions and motoring is the favorite and most indulged in pastime.

Motoring in Southern Resorts.

Although the sun shines brightly and the days are fairly warm at the favored spots, it must be remembered that once the sun sets there comes up a chill air that makes a wrap indispensable. Indeed the frosts of Florida have become famous and a drop of 30 degrees in the temperature within a few hours is not an uncommon experience by any means. To be so clad as to meet such extremes, for they are regarded as being on the regular program, is the aim of the experienced motor traveler. Whether one goes South by rail and sends the motor

by the same transportation, or journeys down by easy stages in the car, the question of an appropriate wardrobe must be given forethought and discretion.

The eccentricities of the temperature in our own climate, which one day make furs and the heaviest of winter apparel imperative for comfort and the next drifts into a heavy damp warmth makes for great diversity in the matter of motor dress. One cannot, of course, change their outer garments with safety, but the frock and sweater may easily give more warmth or otherwise. A smart new frock built purposely for the car is of fern colored Petuna cloth, made with short, straight skirt, and a long sleeved, plaited and belted three-quarter coat. A loose coat of soft brown suede leather, reaching to the bottom of the skirt, is ideal to wear with this frock. It is equipped with large patch pockets, the new "submarine" cuff, is double-breasted and has large, round bone buttons matching in tone.

These Models in Spring, Too.

All the new smart coats now shown for southern wear are models for spring in the North, and they possess very many interesting features and the knowing woman begins to prepare her wardrobe now, for the seasons are so short and fashion's whims so changeable with each season that it is well to be ready at the very beginning if one wishes to derive satisfactory benefit from her expenditure.

Among the new models shown was one of khaki colored Worumbo Pollu, lined with the softest light brown kid. The new "Aviation" collar appeared on this coat. This collar may be worn in cape fashion, or, by throwing it over the head and fastening the button at the back, may be converted into a snugly fitting hood. A frock to wear with this coat was of gold Roshanara Crepe, having a panel front and back, made on straight lines, its only accessory being a patent leather belt finished by a large brass buckle.

A particularly attractive motor costume was of the excellent Standware Jersey Cloth in raisin color. The frock had a skirt shirred around the hips and one pocket buttoned at the seam on the left side with raisin colored glass buttons. The bodice buttoned down the front with the same glass buttons and the sleeves were of elbow length, something we shall see to a great extent in the new models. The long coat of the same material is lined with putty colored Waterside Corduroy and is edged with Hudson Seal at the fastening and has a large collar and gauntlet cuffs of the seal. Still another frock was of Hunter green Standware Jersey, decidedly scant about the ankles, but wider, as in the barrel style of last spring, toward the hips. The skirt part and bodice were joined in deep points with tiny nail heads of green glass.

Feature in Motoring Clothes.

The Standware Jersey Cloth will be featured to an exceptionally great extent for motoring clothes, and it is a material of much excellence with just the

qualities that make it particularly adaptable for motor wear. There is no sagging or stretching with this jersey cloth, as is quite apt to be the case with many jersey materials, and it does not wrinkle and will stand the hardest kind of wear and still present its original fresh appearance. There are several different weights, in both the silk and wool, and all the new shades are represented.

"Over the Top" Garments.

All the new sweater models are being shown and there is a marked tendency toward the most practical of garments in this line. The brushed wool models are to be decidedly popular and will be in high shades. One handsome style has a trimming of Roman stripes in five or six shades. There are wide sports belts and wide sailor collars on these models. Another model has hair-line striping, the striping being in white on solid colors at the skirt edge and across the collar and cuffs. Many of the "over the top" style are shown and those that are purled from the bottom to a point well above the waist line, or dovetailed, as the manufacturers call it, will be in great demand. A very handsome new model is of hockey red in a heavy woven silk. A pleat down the centre of the back gives this garment originality. The fronts are finished with collar and wide revers in cream color woven in fancy stitch and the belt is patent leather. The model shown is a very handsome one and exceptionally well cut and of smart fit. It represents one of the newest and best sweater models for 1918.

A favorite in headgear for the motorist—and particularly among the younger set, are the new Blue Devil motor caps



One of the New 1918 Models in sweaters, showing the practical style to be in evidence for the motor woman. The exceptional fit of this garment and its comfortable and attractive appearance are greatly to be commended. Courtesy Standard Knitting Co., Cleveland, O.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

What This Organization Does for Motorists

Operations and Services of the Legal, Highway, Touring, Supply
and Insurance Departments—The Eagle Emblem and Free Magazine

THE National Automobile Association, the New England Department Massachusetts Division of the National Highways Association, which is now rounding out the 14th year of its existence, is enjoying the most flourishing state of its existence and this growth is a strong testimonial to the remarkable service it has rendered its members and motorists in general.

Through its service branches, the Legal, Highway, Touring, Supply and Insurance Departments, the organization has wielded a wide and powerful influence for the benefit of its members and motoring conditions, as it has continually conducted an active propaganda for road improvements, fair legislation and better conditions generally surrounding and affecting touring.

Some of the leading citizens of the Commonwealth of Massachusetts are interested in the association and serve in directing its affairs. Hon. John Lewis Bates of Boston, former governor of the state and a leading member of the Massachusetts Bar, is president. Roland F. Gammons is vice president, Charles J. A. Wilson is treasurer and George Hamilton Power secretary. The trustees are: Charles D. Lanning, Boston; Royden Loring, Boston; William B. Plunkett, Adams; Frank A. Dewick, Boston; Arthur H. Lowe, Fitchburg; Harry J. Olmsted, Winchester; Edgar W. J. Hearty, Boston, and Raymond F. Briggs, Norton.

Headquarters of the National Automobile Association is located at 9 Park street, Boston, Mass.

Probably the most noteworthy work accomplished by the organization is in its participation in legal affairs, giving as it does, free legal advice and assistance to members in all their automobile troubles and accidents. Members are defended free for violations of automobile laws anywhere in New England and in suits brought against them for damage to property or matters of bills for repairs where unreasonable charges have been made. Cooperation with the public authorities in securing the revocation of the licenses of unreasonable, reckless or intoxicated drivers is also undertaken by the organization and other work along similar lines to promote safer road conditions.

While the membership fee is only \$5 annually, the service it entitles the member to is far greater than could be secured were it not for the cooperative effort of the large membership. Many times this fee is realized by the member in the course of a year in the form of services, information, advice and touring matter. The fact that there are over 70 attorneys representing the association makes it possible to get in touch with an advisor on short notice in case of a conflict with the authorities, which is a common occurrence and often unnecessarily inconveniences tourists.

In addition to these services which are contingent upon their requirement, members also receive equipment that has immediate tangible value. A beautiful nickel eagle, insignia of the association, which was designed by the celebrated

sculptor, Bela L. Pratt, is given each member as a radiator emblem, also one of the Red Road Books, containing road maps covering New England, New York, New Jersey, Pennsylvania, Maryland, Delaware and Virginia; besides 153 city street maps and valuable touring information.

Through the Automobile Journal, the official magazine of the association, which the members receive free, they are given twice monthly a review of the activities of the organization, information bearing on legal matters, touring news and other information. In addition to this insert in this magazine, devoted exclusively to the N. A. A. matters, the members receive the general information of the motor car industry which is chronicled in the Automobile Journal, including touring stories, descriptions of new cars, accessories and new mechanical devices.

Additional touring data is also furnished in the form of the special maps covering the principal touring routes in this part of the country, and the N. A. A. route cards and timely bulletins, the latter containing detailed road directions, maps, location of traps, laws, police activities. Special motor tours to this country and Canada are also prepared by the association, and the member who contemplates either a short or long tour can call upon the Touring Department and receive an itinerary giving points of interest along the way, recommendations as to the best hotels and garages to patronize and an approximate sum of the cost of the trip.

When a motorist joins the National Automobile Association he automatically becomes a member of the National Highway Association, and becomes personally identified with the great work that organization is accomplishing in behalf of good roads throughout the nation. This membership is free and carries with it the membership button, costly four-colored plate maps and other valuable publications and data sent out by the organization.

Members also receive assistance in recovering stolen cars and articles and are assisted in securing competent chauffeurs and reliable advice and service in procuring proper insurance policies.

In fact, the association is an organization of motorists banded together for the purpose of securing the benefits that can

come only from cooperative effort and which include practically all the services that are required by those who use automobiles, and these services are secured at a minimum of cost. Such an association of persons, wielding its strength of numbers in behalf of better legislation and good roads, not only contributes to the mutual welfare of all the members, but also the good of the public at large. Through the highway department alone much has been accomplished in eliminating dangerous curves and corners, reduction of hedges, bushes, trees, sandbanks and other obstructions along the highways, and the erection of uniform sign boards that greatly aid the motorist in following routes and reaching their destination with the most convenience and without accident.

Law Draws Line on Car Larceny

Iowa Jurist, in an Intricate Joy-Riding Case Shows Distinction Between Deceit and Theft

INASMUCH as most of the motor vehicle laws contain a provision making it a criminal offense for a person to use another's automobile without his consent, the following Iowa case throws considerable light upon this law.

It appears that a man was indicted under a section of the state code for stealing an automobile and he was tried and acquitted by a jury.

The part of the code material to the question in issue was as follows: * * *

"If any chauffeur or other persons without the consent of the owner take, or causes to be taken, an automobile or motor vehicle and operate or drive or cause the same to be operated or driven, he shall be imprisoned."

At the close of the testimony in the case counsel for the state requested the court to give the following instruction:

"That consent given by the owner of the car, given for specific purpose or for a stated time, would not be consent to use the car for a different purpose, nor generally, nor for any unlimited time, and the consent to use the car for a period of 15 or 20 minutes would not be consent to drive a car to a place named."

The court refused to give the above instruction, but in lieu thereof gave the following:

"The gist of the offense charged is taking and driving the motor car in question without the consent of the owner. The defendant is not on trial in this case for any other offense than that charged in the indictment. If the owner consents to the person charged taking and driving the car, then the person charged cannot be convicted of taking and driving the car, even though he may drive it for a longer distance, or may damage the car, or even convert it to his own use. If the owner consents to the taking and driving and suffers any wrong therefrom, then his remedy is something other than a prosecution

under the statute for taking and driving without his consent.

The above statute, the Supreme Court of Iowa says, was evidently enacted for the purpose of providing punishment for the taking and operating of an automobile or other motor vehicle, or causing the same to be taken and operated, without the consent of the owner, under circumstances not amounting to larceny.

(1) The taking of the motor vehicle and operating the same, without intention of appropriating it permanently to the use of the person so taking and operating it, is not larceny, and could not be punished as such.

It appears from the evidence that the defendant obtained consent of the owner to take and operate his automobile for 15 or 20 minutes and that after obtaining possession thereof, drove the same to Ottumwa, and then with some companions to Muscatine, where the car became disabled and was left in a garage. It is contended on behalf of the appellant that consent obtained by trick, deceit or misrepresentation is consent in fact.

(2) The word "consent" as used in this connection, we think, should be interpreted as meaning voluntarily yielding the will to the possession of another, acquiescence or compliance therewith. The owner's consent must precede the act of taking or assuming possession of the motor vehicle, and does not relate to what transpires thereafter. As said by the court the gist of the offense is the taking or operating, or causing a motor vehicle to be taken or operated by another without the consent of the owner. The statute was not designed to punish one who obtains consent of the owner to take and operate his motor vehicle by misrepresentation or for a fraudulent purpose, but one who takes possession therefore without the consent of the owner. Held that the ruling of the trial court was substantially correct.

NOTICE TO ALIEN ENEMIES.

An embarrassing situation has developed for motor vehicle owners of the country who have in their employ as chauffeurs men of countries with which the United States is at war and who come under the classification of "alien enemies." It has come to the attention of the general counsel of the association that there are quite a number of the above described chauffeurs now in the employ of Americans, and in order that they may be saved not only from annoyance, but possible arrest and imprisonment, it will be advisable for all concerned to bear in mind the recent proclamation of the President of the United States and the subsequent orders of the Department of Justice, as promulgated by the United States marshal for the District of Massachusetts, and govern themselves accordingly.

The notice to alien enemies is that all "alien enemies" must keep 100 yards from all docks, wharves and piers in the district of Massachusetts. They must not be employed in any maritime occupation in the waters adjacent to the district of Massachusetts.

Any "alien enemy" found within 100 yards of any dock, pier or wharf, or employed in any maritime occupation, will be immediately arrested. It is the duty of all citizens to notify this office of any violation of any of the foregoing rules.

MASSACHUSETTS AUTOMOBILE REGISTRATIONS.

There are now 214,299 persons in the state authorized to operate motor vehicles, exclusive of motorcyclists. The new licenses, including both private operators and chauffeurs, number 69,487, and the renewed licenses 144,742. Nearly 27,000 people who were licensed to operate last year failed for one reason or another to renew their licenses this year.

There were registered 174,274 motor cars and trucks, the latter numbering 26,008. The increase in the total of cars and trucks is 37,465, compared to 34,176 the year previous. While in actual numbers the increase this year was greater than last, there was a falling off in the percentage of gain, the increase this year being about 27 per cent. compared to 31 per cent. in 1916. The trucks also fell off in percentage, which is 37 this year compared to 52 last year.

A comparison of the automobile business of the commonwealth for the years 1916 and 1917 follows:

	1916	1917
Automobiles ...	\$136,807	\$174,274
Motorcycles ...	10,713	11,165
Manufacturers or dealers...	1,977	2,379
Licenses (operator and chauffeur ...)	56,903	69,487
Operator and chauffeur renewals	114,693	144,742
Examinations	12,506	17,336
Total receipts...	\$1,564,353.81	\$1,969,813.15



Motor Road Through a Jungle Near Daytona, One of the Favorite Routes for Tourists.

TOURING TO FLORIDA

THE Automobile Club of America presents the latest available information through its chief road man concerning a motor tour from New York to Miami, Fla., over the Capitol highway via Washington, Pinehurst, Augusta, Savannah and Jacksonville.

From New York run through Newark, Elizabeth, Rahway and Metuchen to New Brunswick, thence the Cranbury turnpike is followed to Hightstown. From Hightstown run to Windsor, disregarding the Trenton sign to turn right, and continue straight on to a macadam four corners; turn right and run through Robbinsville and Mercerville to Trenton, which provides all hard surface road in good condition. From Trenton to Philadelphia the highway is also in good condition.

Fine Hard Surfaced Highways.

On the way from Philadelphia to Wilmington the road is hard surfaced and in fair condition. Between Wilmington and Elkton at present there are a few short detours, made necessary by bridge construction. Motorists can obtain a chart over the best road by applying to the clerk at the Hotel Dupont in Wilmington. From Elkton, through Baltimore to Washington, the road is all open and in good condition.

From Washington through Alexandria, Accountink and Lorton to three miles beyond Occoquan, the road is improved surface in good condition. From that point to Dumfries there is an eight-mile stretch of very narrow, rough road. That portion of the road from Dumfries, crossing the Chappawamsic swamp, is very

narrow and apt to be slippery in wet weather. The government is working on a four-mile stretch of new concrete road leading to the marine camp at Quantico. The remainder of the road through Fredericksburg to Richmond, is in very good condition.

Twenty Miles Full of Holes.

The 20-mile stretch between Richmond and Petersburg is full of holes and in such a poor condition that the spring makers on each end of the route are doing a rushing business. From Petersburg through Dinwiddie and South Hill to Clarksville is a graded clay road which is in fair condition with the exception of a few gullies. From Clarksville through Oxford to Durham, N. C., is fair going with the exception of a few rough and rutted stretches. From Durham through Cary, Sanford and South River to Pinehurst the road is mostly in good condition, though now and then a rough stretch will be encountered; the same condition existing between Pinehurst and Cheraw. For 10 miles beyond Cheraw the road is unimproved and very rough and careful driving will be necessary. From that point on through McBee there is a stretch of 15 miles which is a credit to the town and the balance of the road to Camden is in fair condition.

Leaving Camden and driving through Columbia, Batesburg and Aiken to within five miles of Augusta the road is in fair condition. From that point on into Augusta the surface is rough. The best road by which to reach Atlanta from Augusta is by way of Harlem, Thomp-

son and Crawfordsville to Athens, thence via Winder, Lawrenceville and Decatur to Atlanta. From Augusta through Sylvania to Savannah the road is in good condition most of the way, and can be traversed without any difficulty. From Savannah to Darien conditions are fair, with the exception of one or two short stretches, and the Allamaha river is crossed at Darien by running the automobiles on flat cars, which is accomplished without any trouble.

Troublesome Spots Nearing Jacksonville.

On the way to Jacksonville there are two or three places which are apt to be troublesome in wet weather, although much improved since last year, as convicts have been working for the past six months filling and grading. From Jacksonville to St. Augustine is all good brick, with the exception of four miles at the end of Duval county, which is under construction and when finished will make 70 miles of brick surface between Jacksonville and Daytona. The 20 miles of beach from Ormond down the coast is also good at low tide. From that point to Miami the entire east coast is in good condition. Palm Beach county, having finished its section during the summer, makes it all hard surface.

The new bridge under construction at Stewart, crossing the St. Lucie river, will not be finished for another year, which makes it necessary to use the ferry as heretofore. From Daytona, crossing the peninsula through Orlando and Kissimmee to Tampa the road is mostly in good condition, with the exception of a few places under construction, the poorest stretch being from Auburndale to Lakeland. From Tampa to Petersburg the road is largely of brick and in good condition.

Passenger Cars and Car Makers for 1918

Listed Alphabetically with Addresses of the Manufacturers

- ABBOTT**, Abbott Corp., Cleveland, O.
ALLEN, Allen Motor Car Co., Fostoria, O.
AMERICAN, American Motors Corp., Plainfield, N. J.
AMERICAN BEAUTY, Pan American Motors Co., Chicago, Ill.
ANDERSON, Anderson Motor Co., Rock Hill, S. C.
ANDERSON ELECTRIC, Anderson Electric Car Co., Detroit, Mich.
APPERSON, Apperson Brothers Auto Co., Kokomo, Ind.
AUBURN, Auburn Automobile Co., Auburn, Ind.
AUSTIN, Austin Automobile Co., Grand Rapids, Mich.
BAKER, R. & L., Baker, R. & L. Co., Cleveland, O.
BELL, Bell Motor Car Co., York, Pa.
BIDDLE, Biddle Motor Car Co., Philadelphia, Pa.
BIRCH, Birch Motor Cars, Chicago, Ill.
BOUR-DAVIS, Shadbourne Combined Motors Co., Chicago, Ill.
BREWSTER, Brewster & Co., Long Island City, N. Y.
BRISCOE, Briscoe Motor Corp., Jackson, Mich.
BUICK, Buick Motor Co., Flint, Mich.
BUSH, Bush Motor Co., Chicago, Ill.
CADILLAC, Cadillac Motor Car Co., Detroit, Mich.
CAMPBELL, Campbell Motor Car Co., Kingston, N. Y.
CASE, J. I., Case T. M. Co., Racine, Wis.
CHALMERS, Chalmers Motor Co., Detroit, Mich.
CHANDLER, Chandler Motor Car Co., Cleveland, O.
CHEVROLET, Chevrolet Motor Co., Flint, Mich.
COLE, Cole Motor Car Co., Indianapolis, Ind.
COLUMBIA, Columbia Motors Co., Detroit, Mich.
COMET, Comet Automobile Co., Decatur, Ill.
COMMONWEALTH ULTRA, Commonwealth Motors Co., Chicago, Ill.
CRAWFORD, Crawford Automobile Co., Hagerstown, Md.
CROW-ELKHART, Crow-Elkhart Motor Car Co., Elkhart, Ind.
CRUISER, Cruiser Motor Car Co., Madison, Wis.
CUNNINGHAM, J. Cunningham Son & Co., Rochester, N. Y.
DANIELS, Daniels Motor Car Co., Reading, Pa.
DAVIS, G. W., Davis Motor Car Co., Richmond, Ind.
DETROIT ELECTRIC, Anderson Electric Car Co., Detroit, Mich.
DISPATCH, Dispatch Motor Car Co., Minneapolis, Minn.
DIXIE FLYER, Dixie Motor Car Co., Louisville, Ky.
DOBLE, Doble-Detroit Steam Motors Co., Detroit, Mich.
DODGE BROTHERS, Dodge Brothers, Detroit, Mich.
DORRIS, Dorris Motor Car Co., St. Louis, Mo.
DORT, Dort Motor Car Co., Flint, Mich.
DOUGLAS, Douglas Motors Corp., Omaha, Neb.
DUNN, Dunn Motor Works, Ogdensburg, N. Y.
EAGLE, Eagle-Macomber Motor Car Co., Sandusky, O.
ECONOMY, Economy Motor Car Co., Tiffin, O.
ELCAR, Elkhart Carriage and Motor Car Co., Elkhart, Ind.
ELGIN, Elgin Motor Car Corp., Chicago, Ill.
EMPIRE, Empire Auto Co., Indianapolis, Ind.
ERIE, Erie Motor Car Co., Painesville, O.
FAGEOL, Fageol Motors Co., Oakland, Cal.
FIAT, F. I. A. T. Co., Poughkeepsie, N. Y.
FORD, Ford Motor Co., Detroit, Mich.
FRANKLIN, H. H. Franklin Mfg. Co., Syracuse, N. Y.
FRITCHLE, Fritchle Electric Co., Denver, Col.
FRONTMOBILE, Camden Motors Corp., Camden, N. J.
F. R. P., F. R. Porter Co., Port Jefferson, N. Y.
GERONIMO, Geronimo Motor Co., Enid, Okla.
GHEENT, Ghent Motor Co., Ottawa, Ill.
GLIDE, Bartholomew Co., Peoria, Ill.
GRANT, Grant Motor Car Corp., Cleveland, O.
HACKETT, Hackett Motor Car Co., Jackson, Mich.
HAL, Hal Motor Car Co., Cleveland, O.
HALLADAY, Barley Motor Car Co., Streator, Ill.
HARROUN, Harroun Motors Corp., Detroit, Mich.
HARVARD, Harvard-Pioneer Motor Car Co., Troy, N. Y.
HASSLER MOTOR CO., Indianapolis, Ind.
HATFIELD, Cortland Cart and Carriage Co., Sidney, N. Y.
HAYNES, Haynes Automobile Co., Kokomo, Ind.
HESELTINE, Heselstine Corp., New York, N. Y.
HOLLIER, Lewis Spring and Axle Co., Chelsea, Mich.
HOLMES, Holmes Automobile Co., Canton, O.
HOMER-LAUGHLIN, Homer-Laughlin Eng. Co., Los Angeles, Cal.
HUDSON, Hudson Motor Car Co., Detroit, Mich.
HUPMOBILE, Hupp Motor Car Co., Detroit, Mich.
HUPP-YEATS ELECTRIC CAR CO., Detroit, Mich.
INTER-STATE, Inter-State Motor Co., Muncie, Ind.
JACKSON, Jackson Automobile Co., Jackson, Mich.
JONES, Jones Motor Car Co., Wichita, Kan.
JORDAN, Jordan Motor Car Co., Cleveland, O.
KING, King Motor Car Co., Detroit, Mich.
KISSELKAR, Kissel Motor Car Co., Hartford, Wis.
KLINE, Kline Car Corp., Richmond, Va.
KNIGHT SPECIAL, Watson & Stoeckel, 251 West 57th St., New York City.
LAMBERT, Buckeye Mfg. Co., Anderson, Ind.
LAUREL, Laurel Motor Car Co., Richmond, Ind.
LENEX, Lenox Motor Car Co., Boston, Mass.
LEXINGTON, Lexington-Howard Co., Connerville, Ind.
LIBERTY, Liberty Motor Car Co., Detroit, Mich.
LOCOMOBILE, Locomobile Co. of America, Bridgeport, Conn.
LOZIER, Lozier Motor Co., Detroit, Mich.
LUVERNE, Luverne Automobile Co., Luverne, Minn.
McFARLAN, McFarlan Motor Co., Connerville, Ind.
MACON, Macon Automobile Co., Macon, Ga.
MADISON, Madison Motors Co., Anderson, Ind.
MAIBOHM, Maibohm Motors Co., Racine, Wis.
MAJESTIC, Majestic Motor Co., New York, N. Y.
MARMON, Nordyke & Marmon Co., Indianapolis, Ind.
MAXWELL, Maxwell Motor Co., Detroit, Mich.
MERCER, Mercer Automobile Co., Trenton, N. J.
METZ, Metz Co., Waltham, Mass.
MILBURN, Milburn Wagon Co., Toledo, O.
MITCHELL, Mitchell Motors Co., Racine, Wis.
MOBILE-KNIGHT, Moline Automobile Co., East Moline, Ill.
MONITOR, Monitor Motor Car Co., Columbus, O.
MONROE, Monroe Motor Co., Pontiac, Mich.
MOON, Moon Motor Car Co., St. Louis, Mo.
MOORE, Moore Motor Co., Minneapolis, Minn.
MURRAY, Murray Motor Car Co., Pittsburgh, Pa.
NASH, Nash Motors Co., Kenosha, Wis.
NATIONAL, National Motor Car and Vehicle Corp., Indianapolis, Ind.
NAPOLEON, Traverse City Motor Car Co., Traverse City, Mich.
NELSON, E. A. Nelson, Detroit, Mich.
NORWALK, Norwalk Motor Car Co., Martinsburg, W. Va.
OAKLAND, Oakland Motor Car Co., Pontiac, Mich.
OHIO ELECTRIC, Ohio Electric Car Co., Toledo, O.
OLDSMOBILE, Olds Motor Works, Lansing, Mich.
OLYMPIAN, Olympian Motors Co., Pontiac, Mich.
OVERLAND, Willys-Overland Co., Toledo, O.
OWEN-MAGNETIC, Baker R. & L. Co., Cleveland, O.
PACKARD, Packard Motor Car Co., Detroit, Mich.
PAIGE, Paige-Detroit Motor Car Co., Detroit, Mich.
PAN AMERICAN, Pan American Motors Co., Chicago, Ill.
PAN, Pan Motor Co., St. Cloud, Minn.
PARTIN-PALMER, Commonwealth Motors Co., Chicago, Ill.
PATERSON, W. A. Paterson Co., Flint, Mich.
PEERLESS, Peerless Motor Car Co., Cleveland, O.
PHIANNA, Phianna Motors Co., Newark, N. J.
PIERCE-ARROW, Pierce-Arrow Motor Car Corp., Buffalo, N. Y.
PILGRIM, Pilgrim Motor Car Co., Detroit, Mich.
PILOT, Pilot Motor Car Co., Richmond, Ind.
PREMIER, Premier Motor Corp., Indianapolis, Ind.
PRINCESS, Princess Motor Car Corp., Detroit, Mich.
REGAL, Regal Motor Car Co., Detroit, Mich.
REO, Reo Motor Car Co., Lansing, Mich.
ROAMER, Barley Motor Car Co., Streator, Ill.
SAYERS, Sayers Scovill Co., Cincinnati, O.
SAXON, Saxon Motor Car Corp., Detroit, Mich.
SCRIPPS-BOOTH, Scripps-Booth Corp., Detroit, Mich.
SENECA, Seneca Motor Car Co., Fostoria, O.
SIMPLEX, Simplex Auto Co., New Brunswick, N. J.

SINGER, Singer Motor Co., New York, N. Y.
STANDARD, Standard Steel Car Co, Pittsburgh, Pa.
STANLEY, Stanley Motor Carriage Co., Newton, Mass.
STEARNS-KNIGHT, F. B. Stearns Co., Cleveland, O.
S. S. E., S. S. E. Co., Philadelphia, Pa.
STEINMETZ ELECTRIC, Day Electric Corp., New York, N. Y.
STEPHENS, Stephens Motor Branch Moline Plow Co., Moline, Ill.

STUDEBAKER, Studebaker Corp., South Bend, Ind.
STUTZ, Stutz Motor Car Co., Indianapolis, Ind.
TEMPLAR, Templar Motors Corp., Cleveland, O.
TRUMBULL, Trumbull Motor Car Co., Philadelphia, Pa.
VELIE, Velie Motors Corp., Moline, Ill.
WESTCOTT, Westcott Motor Car Co.,

Springfield, O.
WHITE, White Motor Co., Cleveland, O.
WILLYS-KNIGHT, Willys-Overland Co., Toledo, O.
WINTON, Winton Co., Cleveland, O.
WOODS DUAL POWER, Woods Motor Vehicle Co., 25th St., Chicago, Ill.
WOLVERINE, Wolverine Motors, Inc., Kalamazoo, Mich.
YALE, Saginaw Motor Car Co., Saginaw Mich.

Meaning of Terms Used in Specifications

Horsepower (S. A. E.)—Horsepower in each instance is according to the rating of the Society of Automobile Engineers, whose formula has been generally accepted as standard and consists of multiplying the square of the diameter of the cylinder bore in inches by the number of cylinders and dividing by the constant 2.6. The solution of this formula gives the horsepower at 1600 feet per minute piston speed and should not be taken to indicate the maximum power of which an engine may be capable.

Piston Displacement—This designation is intended to express the space through which the pistons sweep in the cylinder during the completion of one of their strokes. This is determined by multiplying the square of the bore in inches by the constant .7854, and this result by the number of cylinders and finally that sum by the length of the stroke in inches.

Cylinders, Shape and Cast—This refers to the number of cylinders, the general contour of the engine and how the cylinders are grouped. The shapes of the engines are expressed as L-head, T-head, I-head and V. In the L-head type the valves are all on one side; in the T-head, the inlet valves are on one side and the exhaust on the other; in the I-head, the valves are in the head, or there may be one set in the head and another on one side. In the V shaped engine, the valves may be in the head or on the sides, either in the V or on the outside, or a combination of these locations. The grouping of the cylinders is expressed either by block (cylinders all integral), separately (each cylinder individual), 2s (in pairs), 3s (in groups of three each), 4s (an eight-cylinder engine in two blocks of four each), 6s (a 12-cylinder engine with two blocks of six cylinders each).

Type Camshaft Drive—Under this head appears spur, helical and chain, the first referring to a plain spur gear driving the camshaft, the second a helically cut gear and the third a silent chain drive.

Cooling System—Thermo-siphon systems, or natural flow methods, require no circulating pump. In the pump system a centrifugal pump generally is used to force the water through the cooling installation.

Lubrication System—Three systems are shown. The splash system consists of distributing the oil in the crank case by means of dips on the connecting rod ends. In the force feed the oil is pumped to the working parts through leads. The force feed and splash is a combination of the two other methods.

Ignition Type—Four systems are mentioned. The single has one source of current and one set of spark plugs. The double includes magneto and battery and two sets of plugs, of which only one set operates while the engine is running. The dual has battery and magneto and one set of plugs. Two-point ignition has double-distributor magneto and two sets of plugs which operate simultaneously.

Fuel Feed—In the gravity system the gasoline flows naturally from a tank in the cowl, or one under the seat, to the carburetor. In the vacuum system engine suction in an auxiliary tank connected with the carburetor and a tank at

What the Abbreviations Indicate.

SHAPE: I, I-head; L, L-head; T, T-head; V, like letter V.

CAST: Block, cylinders integral; Sep., separately; 2s, in pairs; 3s, in threes; 4s, in two blocks of four each; 6s, in two blocks of six each.

MAKE OF ENGINE: G. B. & S., Golden, Belknap & Schwarz; H. Laughlin, Homer-Laughlin; H. Spill, Herschell-Spillman; Mol. Knight, Moline-Knight; Tur. & Moore, Turner & Moore; Woods-Mil., Woods-Milwaukee.

VALVES: Inside, on the inner sides of the V; Outside, on the outer sides of the V; R. & H., right side and head; R. & L., right and left sides; Sleeve, Knight type of engine.

CLUTCH: B. & B., Borg & Beck; B. & L., Brown & Lippe; Brew., Brewster.

COOLING: Ther.-Syp., thermo-siphon.

LUBRICATION: Force F., force feed; F. F. & Spl., force feed and splash.

IGNITION MAKE: At. Kent, Atwater Kent; Conn., Connecticut; D.-Bijur, Delco and Bijur; Else., Elsemann; Split., Splitdorf; West., Westinghouse; West., B., Westinghouse and Bosch.

IGNITION CONTROL: Auto., automatic; Hand., manual; H. & A., hand and automatic.

CARBURETOR: A. W. T., American Watch & Tool Co.; Hol.-Kgn., Holley & Kingston.

STARTING AND LIGHTING: Helnze-Spring., Helnze-Springfield; Pil. or Auto L., Pilliod or Auto Lite; Stud.-Wagner, Studebaker-Wagner; West., Westinghouse; U. S. L., United States Lighting; Ward-Leon., Ward-Leonard.

GEARSET: Plan-Unit, M. planetary, in unit with engine; Sel.-Amid., selective, amidships; S.-Unit, M., selective, in unit with engine; S.-Unit, X, selective, in unit with rear axle.

GEARSET MAKE: Brew., Brewster; Det., Detroit; Dur., Durston; G. L., Grant-Lees; M., Mech., Mechanics Machine Co.; W., Warner.

TIRES: F. & R., front and rear wheels carry same size tires; colon between figures indicates sizes for two models; comma between figures indicates sizes of rear and front wheels on one model.

SPRINGS: Double Cantl., double cantilever; $\frac{1}{2}$ Ell. Cant., semi-elliptic cantilever.

AXLES: Type, F. F., full floating. Make, A. B. B., American Ball Bearing; Colum., Columbia; Salls., Sallsbury; W. M., Weston-Mott; W. W., Walker-Weiss.

BEARINGS: B. & R., Ball and roller; C. & C., cup and cone. Make, N. D., New Departure.

the rear draws the fuel to the vacuum tank from which it flows by gravity to the carburetor. In the pressure system the fuel is forced by air pressure from the rear tank direct to the carburetor.

Type of Clutch—Under this classification disc includes single and multiple plate types and those that run either in oil or dry. D. D. indicates dry disc. The cone type is familiar without explanation.

Type of Gearset—Selective refers to the type in which any speed is reached direct. The planetary system is distinctive because when in second speed the whole gearset turns as a unit, while the internal gears do not revolve around each other. In the progressive type it is necessary first to pass through first speed to reach higher ones. Friction drive is by a friction disc pressing against a driven disc attached to a shaft that turns the wheels. Unit with motor indicates that the gearset and clutch housings are integral with the engine—a unit power plant. Unit with rear axle means the gearset is integral with the axle housing, while amidships shows that the gearset is midway between the axle and engine.

Drive Through—This refers to whether there is a torque tube surrounding the propeller shaft, or a torque arm placed along side the shaft from the differential to a frame cross member, while springs refer to the Hotchkiss drive in which propulsion is through the rear springs.

Type of Rear Axle—In the full floating type the weight is carried on the axle housing and the axle is flexibly attached to the wheels. The $\frac{1}{2}$ floating is similar to the full floating except that the axle is permanently attached to the wheels. In the $\frac{1}{4}$ floating the bearings are in the axle housing and the axle shaft not only turns the wheels, but helps support the load. The dead type is found only in cars driven by chains, the axle being stationary.

Direct Drive Ratio—The relation of the speed of the crankshaft to that of the wheels on high gear is the reference here. In other words, if the engine turns over three times to one revolution of the rear wheels on direct then the ratio is three to one.

Rear Springs—Elliptic springs take their names from their shapes. The elliptic has the form of a full ellipse; in the $\frac{1}{2}$ elliptic half of the upper member is missing; in the $\frac{1}{4}$ elliptic, simply the lower portion is used. The cantilever type appears to be the $\frac{1}{2}$ elliptic turned upside down. Transverse types are usually of the $\frac{1}{2}$ elliptic type placed across the rear of the car. The platform type has the $\frac{1}{2}$ elliptic on the sides and another transversely mounted and connected with the side members.

Tabular Arrangement and Special Notes—Cars on the pages following are divided into six classes, viz.: 4-cylinder cars, 6-cylinder cars, 8-cylinder cars, 12-cylinder cars, constituting the gasoline car sections, electric cars and steam cars. Under these heads, in the order given, the cars are arranged in alphabetical order. A single tire size indicates the same sized tire front and rear. Prices: The price quoted in the third line of each specification is usually for the touring car model, unless otherwise indicated.

FOUR-CYLINDER GASOLINE PASSENGER CAR MODELS FOR 1918.

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

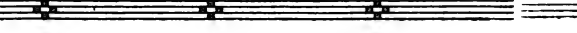
Name of Car	Allen	Bell	Biddle	Birch	Brewster
No. or Name of Model	Series 41	IS	H	Super Four	One
Price	\$1095	\$895	\$2650	\$895	\$5500
Bore and Stroke	3.75x5.00	3.75x5.00	3.75x5.125	3.50x5.00	4.00x5.50
Horsepower (S. A. E.)	22.50	22.50	22.50	19.80	25.60
Piston Displacement	221.0	187.0	226.4	192.0	276.0
Cylinders, Shape, Cast	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block
Who Makes Engine	Continental	G. B. S.	Buda	Lycoming	Brewster
Location of Valves	Right	Left	Right	Left	Sleeve
Type of Camshaft Drive	Helical	Chain	Helical	Helical	Chain
Type of Cooling System	Ther.-Syp.	Ther.-Syp.	Ther.-Syp.	Ther.-Syp.	Pump
Lubrication System	Force, splash	F. F., Spl.	F. F., Spl.	F. F., Spl.	Force
Type of Pump	Plunger	Plunger	Gear	Splash	Gravity
Ignition System	Single	Single	Single	.....	Magneto
Make and Control	Conn., hand	At. Kent, hand	Dixie, hand	Connecticut	Bosch, hand
Make of Carburetor	Stromberg	Zenith	Zenith	Carter	Zenith
Method of Fuel Feed	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Starting System	Auto-Lite	Dyneto	Gray & Davis	Dyneto	U. S. L.
Light. Sys., Make, Volt	Auto-Lite, 6	Dyneto, 6	Gray & Davis	Dyneto, 6	U. S. L., 12
Type, Make of Clutch	Disc, B. & B.	Disc, B. & B.	Disc	Disc	Cone, Brewster
Type, Make of Gearset	S-Unit, M	S-Unit, C	S-Unit, M	S-Unit, M	S-amid, Brew.
Speed Ratios	Three	Three	Four	Three	Three
Drive Through	Springs	Springs	Springs	Springs	Torque
Type, Make Rear Axle	Adams	Adams	Adams	Adams	F. F., Brew.
Direct Drive Ratio	4.46-1	4.50-1	4.00-1	4.25-1	4.25-1
Wheelbase	112 in.	114 in.	122 in.	114 in.	125 in.
Sizes of Tires	32x3 1/2	32x3 1/2	32x4 F. & R.	32x4 1/2	34x4 1/2
Wheels (Wood or Wire)	Wood	Wood	Wire	Optional	Wood
Type of Rear Springs	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	Cantilever
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Shaft
Type Gearset Bearings	S. K. F., ball	Roller	Ball	Roller	Roller
Rear Axle Bearings	Ball	Roller	Ball	Roller	Roller
Front Axle Bearings	Roller	Ball	Ball	Ball	Roller
No. Eng. Main Bearings	Two	Three	Three	Two	Three



Above, Hupmobile; Below, Auburn Convertible Sedan.

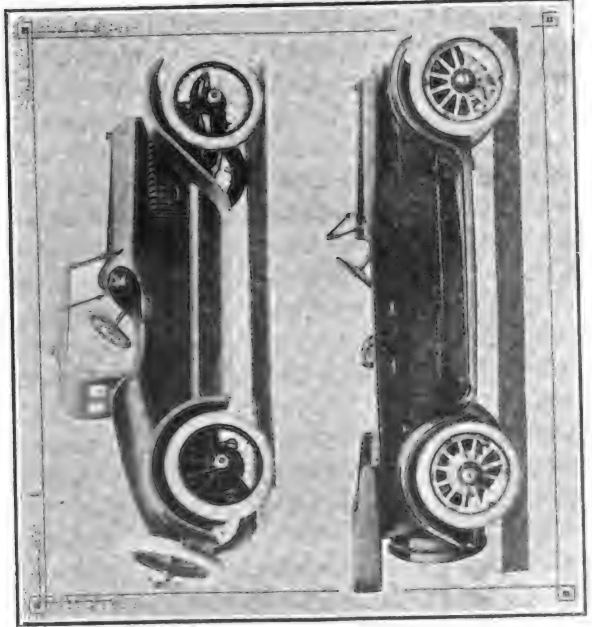
Name of Car	Briscoe	Campbell	Chevrolet	Chevrolet	Commonwealth	Crow-Elkhart	Dispatch	Dixie Flyer	Dodge Bros.
No. or Name of Model	B 4-24	E-34	Four-Ninety	Four-Ninety	Ultra-4-Forty	C. E.	G. Chassis	L. S-35	.....
Price	\$725	\$835	\$635, \$1060	\$635, \$1060	\$995	\$995	\$1250	\$995	\$885
Bore and Stroke	3.187x5.125	3.875x4.000	3.687x4.000	3.687x4.000	3.50x5.00	3.50x5.00	3.75x5.00	3.25x5.00	3.25x5.00
Horsepower (S. A. E.)	16.25	24.14	21.70	21.70	19.80	19.60	32.50	16.90	24.14
Piston Displacement	163.5	188.7	170.88	170.88	192.4	192.4	220.9	165.9	212.3
Cylinders, Shape, Cast	4-L-Block	4-L-Block	4-I-Block	4-I-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block
Who Makes Engine	Briscoe	Metz	Own	Own	Lycoming	Own	Wisconsin	Lycoming	Dodge Bros.
Location of Valves	Right	Right	Head	Head	Side by side	Helical	Left	Right	Right
Type of Camshaft Drive	Helical	Gear	Helical	Helical	Gear	Helical	Helical	Helical	Helical
Type of Cooling System	Ther.-Syp.	Ther.-Syp.	Pump	Pump	Ther.-Syp.	Ther.-Syp.	Ther.-Syp.	Ther.-Syp.	Pump
Lubrication System	F. F., Spl.	Spl., pump	Splash	Splash	Spl., pump	Spl., pump	Force F.	F. F., Spl.	F. F., Spl.
Type of Pump	Plunger	Centrifugal	Gear	Gear	Plunger	Plunger	Gear	Plunger	Eccentric
Ignition System	Single	At. Kent	Single	Single	Single	Single	Single	Single	Single
Make and Control	Conn., hand	A. At. Kent, hand	Remy, hand	Remy, hand	At. Kent, hand	Conn., hand	Bosch, hand	Conn., hand	Delco, auto.
Make of Carburetor	Buick-Carter	Marvel	A. W. & T.	Zenith	Carter	Zenith	Rayfield	Carter	Stewart
Method of Fuel Feed	Gravity	Vacuum	Gravity	Gravity	Vacuum	Gravity	Gravity	Vacuum	Vacuum
Starting System	Auto-Lite	Auto-Lite	Elec. Auto-Lite	Elec. Auto-Lite	Dyneto	Dyneto	U. S. L.	Dyneto	North East
Light. Sys., Make, Volt	Auto-Lite	Auto-Lite, 6	Auto-Lite, 6	Auto-Lite, 6	Dyneto, 6	Dyneto	U. S. L.	Dyneto	North East
Type, Make of Clutch	Cone	Disc, Muncie	Cone, own	Cone, own	Disc, Mech.	Disc	Special	Disc	Disc
Type, Make of Gearset	S-Unit, X	Selective	S-Unit, M, own	S-Unit, M, own	S-Unit, M	S-Unit, M	Special	S-Unit, M	S-Unit, M
Speed Ratios	Three	Four	Three	Three	Three	Three	Four	Three	Three
Drive Through	Torque rod	Springs	Springs	Springs	Springs	Torque tube	Radius rod	Torque tube	Springs
Type, Make Rear Axle	4.23-1	Salisbury	Own	Own	Peru, F. F.	Full floating	Dead	Full floating	Full floating
Direct Drive Ratio	4.08-1	4.25-1	3.65-1	3.65-1	4.25-1	4.00-1	3.12-1	4.75-1	4.166-1
Wheelbase	104 in.	110 in.	102 in.	102 in.	112 in.	114 in.	120 in.	112 in.	114 in.
Sizes of Tires	30x3 1/2	30x3 1/2	30x3 1/2	30x3 1/2	32x3 1/2	32x3 1/2	32x3 1/2	32x3 1/2	32x3 1/2
Wheels (Wood or Wire)	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood
Type of Rear Springs	1/2 elliptic	1/2 elliptic	1/2 cantilever	1/2 cantilever	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, right	Left, centre	Left, centre
Type Gearset Bearings	B. & R.	Ball	Ball	Ball	N. D., double	Roller	Ball	Roller	Roller
Rear Axle Bearings	B. & R.	Ball	Roller	Roller	Ball	Roller	Ball	Roller	Roller
Front Axle Bearings	Ball	Ball	Ball	Ball	Roller	Roller	Ball	Roller	Roller
No. Eng. Main Bearings	Two	Three	Three	Three	Two	Two	Three	Two	Three

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Name of Car	Pan	Pilgrim	Princess	Regal	Reo	Saxon	Seneca	Stearns-Knight	Studebaker	Stuts, 16 V.
No. or Name of Model	250	37	4-36	Hi Power Four	Reo	H&R	D 4-27	S K L 4	Four	S-400, Bearcat
Price	\$950	\$895	\$825	\$795	\$985	\$445	\$850	\$1785	.....	\$2550, \$2750
Bore and Stroke	3.75x4.25	3.75x4.25	3.75x4.25	3.50x4.75	4.12x5.50	2.75x4.00	3.125x4.500	3.750x5.625	3.60x5.00	4.375x6.000
Horsepower (S. A. E.)	19.60	22.50	22.50	19.60	27.20	12.10	15.63	22.50	19.60	30.60
Piston Displacement	194.2	187.9	187.7	183.0	240.5	96.0	141	248.5	212.4	360.8
Cylinders, Shape, Cast	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-L-Block	4-T-Block
Who Makes Engine	G. B. & S.	G. B. & S.	G. B. & S.	G. B. & S.	Reo	Continental	Le Roi	Stearns	Studebaker	R. & L.
Location of Valves	Right	Left	Left	Left	Side	Right	Right	Sleeve	Helical	Helical
Type of Camshaft Drive	Ther.-Sysp.	Ther.-Sysp.	Ther.-Sysp.	Ther.-Sysp.	Pump	Helical	Ther.-Sysp.	Pump	Pump	Pump
Type of Cooling System	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	Splash	Splash	F. F. & Spl.	F. F. & Spl.	Force F.
Lubrication System	Plunger	Plunger	Plunger	Plunger	Plunger	Plunger	Plunger	Gear	Gear	Gear
Type of Pump	Single	Single	Single	Single	Single	Single	Single	Single	Single	Double
Ignition System	Single	Single	Single	Single	Single	Single	Single	Single	Single	.....
Make and Control	Stearns	Stearns	Stearns	Stearns	Stearns	Stearns	Stearns	Stearns	Stearns	Stearns
Make of Carburetor	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Westinghouse	Westinghouse
Method of Fuel Feed	Gravity	Gravity	Gravity	Gravity	Gravity	Gravity	Gravity	Gravity	Gravity	Gravity
Starting System	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy	Make, Volt. Remy
Light. Sys., Make, Volt. Remy	Disc	Disc	Disc	Disc	Disc	Disc	Disc	Disc	Disc	Disc
Type, Make of Clutch	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit	Sel., Detroit
Type, Make of Gearset	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Speed Ratios	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Drive Through	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Type, Make Rear Axle	% F., Adams	% F., Adams	% F., Adams	% F., Adams	% F., Adams	% F., Adams	% F., Adams	% F., Adams	% F., Adams	% F., Adams
Type, Make Rear Axle	4.07-1	4.07-1	4.07-1	4.07-1	4.07-1	4.07-1	4.07-1	4.07-1	4.07-1	4.07-1
Direct Drive Ratio	115 in.	115 in.	115 in.	115 in.	115 in.	115 in.	115 in.	115 in.	115 in.	115 in.
Wheelbase	34x4	34x4	34x4	34x4	34x4	34x4	34x4	34x4	34x4	34x4
Sizes of Tires	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood
Wheels (Wood or Wire)	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood
Type of Rear Springs	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic
Drive and Control	Bevel gear	Bevel gear	Bevel gear	Bevel gear	Bevel gear	Bevel gear	Bevel gear	Bevel gear	Bevel gear	Bevel gear
Type Gearset Bearings	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Rear Axle Bearings	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Front Axle Bearings	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball
No. Eng. Main Bearings	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three

Name of Car	Templar	Trumbull	White	Willis-Knight	Wolverine
No. or Name of Model	445	16 B	16 Valve 4	88-4	Special 4-P. Sport Car
Price	\$1985	\$495	\$3900	\$1525	\$3750
Bore and Stroke	3.75x5.500	2.875x4.000	4.25x5.75	4.125x4.500	3.984x6.000
Horsepower (S. A. E.)	18.20	13.23	28.90	27.19	25.00
Piston Displacement	197.0	103.7	326.3	240.5	299.0
Cylinders, Shape, Cast	4-I-Block	4-L-Block	4-T-Block	4-L-Block	4-L-Block
Who Makes Engine	Templar	Milwaukee	White	Willis-Knight	Ow
Location of Valves	Head	Right	Opposite	Sleeves	Right
Type of Camshaft Drive	Chain	Helical	Helical	Chain	Helical
Type of Cooling System	Pump	Ther.-Sysp.	Centrifugal	Ther.-Sysp.	Pump
Lubrication System	Force F.	Splash	Force F.	Plunger	Plunger
Type of Pump	Gear	Single	Gear	Single	Single
Ignition System	Single	Single	Single	Single	Single
Make and Control	Remy, hand	Splitdorf, hand	White	Splitdorf, hand	Miller
Make of Carburetor	Zenith	Zephyr	Vacuum	Vacuum	Vacuum
Method of Fuel Feed	Vacuum	Gravity	Vacuum	Vacuum	Vacuum
Starting System	Make, Remy	Ward-Leonard	Lece Neville	Auto-Lite	Blur
Light. Sys., Make, Volt. Remy	Disc	Ward-Leonard	L. Neville, 12	Cone	Disc, B. & L.
Type, Make of Clutch	S-Unit, M	S-Unit, X	S-U, M, White	S-U, M, White	S-U, M, B. & L.
Type, Make of Gearset	S-Unit, M	Three	Four	Three	Three
Speed Ratios	.....	.....	.....	.....	.....
Drive Through	.....	.....	.....	.....	.....
Type, Make Rear Axle	% floating	% floating	% F., White	% F., White	% F., A. B. B.
Type, Make Rear Axle	4.43-1	3.60-1	4.30-1	4.30-1	4.10-1
Direct Drive Ratio	118 in.	80 in.	137 1/2, 124 1/2	121 in.	127 in.
Wheelbase	32x4, F. & R.	28x3, F. & R.	35x4 1/2, F. & R.	34x4 1/2, F. & R.	32x4 1/2, F. & R.
Sizes of Tires	Wood	Wire	Wood	Wood	Wire
Wheels (Wood or Wire)	Wood	Wire	Wood	Wood	Wire
Type of Rear Springs	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Ball	Ball	Ball	Ball	Ball
Rear Axle Bearings	Roller	Ball	Ball	Roller	Roller
Front Axle Bearings	Three	Three	Three	Three	Three
No. Eng. Main Bearings	Three	Three	Three	Three	Three

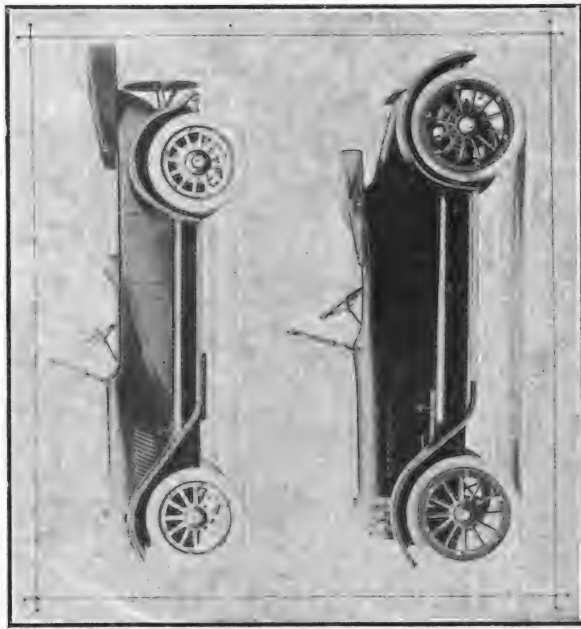


Above, National 12-Cylinder Speedster; Below, Case Six.

SPECIFICATIONS OF 1918'S SIX-CYLINDER PASSENGER CARS.

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

Name of Car	Woods Dual P.	Abbott	American Six	Anderson	Auburn	Auburn
No. or Name of Model	6-44	6-44	B	Six-40	6-44	6-39-B
Price	\$1295	\$1295	\$1375	\$1435	\$1685	\$1345
Bore and Stroke	3.25x4.50	3.25x4.50	3.125x5.000	2.25x4.50	3.50x5.25	3.25x4.50
Horsepower (S. A. E.)	25.35	25.35	23.40	23.35	25.40	25.40
Platen Displacement	350.0	350.0	330.0	224.0	303.1	224.0
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Continental	Continental	Rutenber	Continental	Continental	Continental
Location of Valves	Left	Right	Right	Right	Right	Right
Type of Camshaft Drive	Helical	Helical	Helical	Helical	Helical	Helical
Type of Cooling System	Ther.-Sysp.	Pump	Pump	Pump	Pump	Pump
Lubrication System	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	Force F.	Force F.	F. F. & Spl.
Type of Pump	Plunger	Plunger	Plunger	Plunger	Plunger	Plunger
Ignition System Type	Single	Single	Single	Single	Single	Single
Make and Control	At. Kent, auto.	Remy, hand	G. & D., hand Conn.	Zenith	Delco, H. & A.	Delco, H. & A.
Make of Carburetor	Stromberg	Stromberg	Vacuum	Gravity	Rayfield	Rayfield
Method of Fuel Feed	Stromberg	Vacuum	Vacuum	West	Vacuum	Vacuum
Starting System Make	Double	Remy	Gray & Davis	West	Delco, 6	Remy, 6
Light. Sys., Make, Volt	48	Disc	G. & D., 6	Disc	Disc	Disc
Type, Make of Clutch	Mag., Cut-H.	S-Unit, M	Disc, B. & B.	S-Unit, M	S-Unit, M	S-Unit, M
Type, Make of Gearset	None	Three	Three	Three	Three	Three
Speed Ratios	Direct	Three	Three	Three	Three	Three
Drive Through	Springs	Springs	Springs	Springs	Springs	Springs
Type, Make Rear Axle	1/2 F., Woods	1/2 floating	1/2 floating	1/2 floating	1/2 floating	1/2 floating
Direct Drive Ratio	3.25-1	4.42-1, 4.75-1	4.42-1	4.42-1	4.00-1	4.42-1
Wheelbase	124 1/2 in.	122 in.	122 in.	120 in.	131 in.	120 in.
Sizes of Tires	32x4 1/2	32x4	32x4	32x4	35x4 1/2	35x4 1/2
Wheels (Wood or Wire)	Wood or wire	Wood	Wood	Wood	Wood	Wood
Type of Rear Springs	Cantilever	1/2 elliptic	1/2 elliptic	1/2 elliptic	Cantilever	1/2 elliptic
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Ball	B. & P.	B. & P.	Roller	Ball	Roller
Rear Axle Bearings	Ball	B. & R.	Ball	Ball	Roller	Roller
Front Axle Bearings	Roller	Ball	Ball	Ball	Ball	Ball
No. Eng. Main Bearings	Three	Three	Three	Three	Three	Three

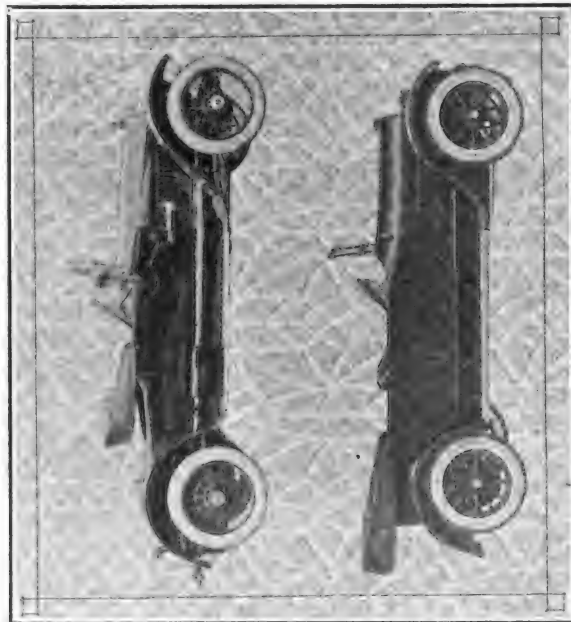


Above, Oldsmobile Speedster; Below, Grant Roadster.

Name of Car	Austin	Birch	Bour-Davis	Buick	Case	Chalmers	Chandler	Columbia Six	Columbia Six
No. or Name of Model	48-66	Light Six	18 B	E-45	U	Six 30	18	Six A	Six B
Price	\$3400	\$1055	\$1650	\$1361	\$1875	\$1365	\$1595	\$1350	\$1495
Bore and Stroke	4.50x6.00	3.00x4.25	3.50x4.50	3.375x4.500	3.50x5.25	3.25x4.50	3.50x5.00	3.25x4.50	3.25x4.50
Horsepower (S. A. E.)	36.00	21.60	25.30	27.34	29.40	25.40	29.40	25.30	25.30
Platen Displacement	371.0	180.0	224.0	241.0	303.1	224.0	288.4	224.0	224.0
Cylinders, Shape, Cast	6-T-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Teetor	Falls	Continental	Buick	Continental	Chalmers	Chandler	Continental	Continental
Location of Valves	Head	Head	Right	Head	Right	Left	Slide	Right	Right
Type of Camshaft Drive	Gear	Helical	Gear	Helical	Helical gear	Helical	Chain	Gear	Pump
Type of Cooling System	Pump	Ther.-Sysp.	Pump	Pump	Pump	Ther.-Sysp.	Pump	Pump	Pump
Lubrication System	Force F.	Spl., Pump	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.
Ignition System Type	Two point	Battery	Single	Single	Bat. V. unit	Single	Plunger	Single	Single
Make and Control	Bosch, hand	Remy	Remy, hand	Delco	West, hand	Remy, H. & A.	Gray & Davis	At. Kent.	At. Kent.
Make of Carburetor	Master	Stewart	Stromberg	Marvel	Rayfield	Stromberg	Rayfield	Stromberg	Stromberg
Method of Fuel Feed	Vacuum	Vacuum	Gray & Davis	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Starting System Make	Bosch	Splitdorf	Gray & Davis	Delco	Westinghouse	West.	Gray & Davis	Ward-Leon.	Ward-Leon.
Light. Sys., Make, Volt	Bosch	Splitdorf 6	Gray & Davis	Delco	West, 6	West.	Gray & Davis	Robben, 6	Robben, 6
Type, Make of Clutch	Disc	Cone	Disc	D. P.	Disc, 6	Disc, 6	Disc, 6	Disc, 6	Disc, 6
Type, Make of Gearset	S-Unit, M	S-U., M., Lewis	S-Unit, M	Sel., Buick	Sel., G. L.	S-Unit, M	Selec., B. & B.	S-Unit, M	S-Unit, M
Speed Ratios	6, 2 reverse	Three	Three	Torque tube	Springs	Springs	Springs	Springs	Springs
Drive Through	Springs	Torque tube	Springs	Floater, W. M.	1/2 floating	1/2 floating	F. F., Chandler	1/2 floating	1/2 floating
Type, Make Rear Axle	Full floating	Full floating	1/2 floating	4.08-1	4.46-1	4.75-1, 5.18-1	4.26-1	4.75-1	3.90-1
Direct Drive Ratio	5.25-1	4.25-1	4.42-1	118 in.	118 in.	115, 122 in.	128 in.	115 in.	115 in.
Wheelbase	142 in.	116 in.	118 in.	84x4	35x4 1/2	32x4, 34x4	34x4	32x4	32x4
Sizes of Tires	34x4 1/2	32x4 1/2	32x4 F. & R.	Wood	Wood	Wood	Wood	Wood	Wire
Wheels (Wood or Wire)	Wood	Optional	Wood	Cantilever	1/2 elliptic	1/2 elliptic	1/2 elliptic	Cantilever	Cantilever
Type of Rear Springs	Double cantl.	Cantilever	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Drive and Control	Ball	Ball	Ball	Ball	Ball	Roller	Ball	Ball	Ball
Rear Axle Bearings	Roller	Ball	Roller	B. & R.	Roller	Roller	Roller	Cup and cone	Cup and cone
Front Axle Bearings	Roller	Ball	Ball	Ball	Roller	Roller	Roller	Cup and cone	Cup and cone
No. Eng. Main Bearings	Four	Three	Three	Four	Three	Three	Three	Three	Three

Name of Car	Comet	Crawford	Davis	Davis	Dorris	Elcar	Elgin Six	Empire 6	Fageol	Franklin
No. or Name of Model	Centennial Six	6-40	Six H-I	Six J	1 C 6	D-6, E-2, G-6	Series F	70 A, 70 S, 73	100	Series 9
Price	\$1285	\$2250	\$1485	\$1785	4,000x5.00	\$2250, \$1795	\$1095	\$1345, \$1685	\$1000	\$2000, \$3200
Bore and Stroke	3.50x5.00	3.50x5.25	3.50x5.25	3.50x5.25	3.50x5.25	3.50x5.25	3.00x4.25	3.25x4.50	5.00x7.00	3.125x4.000
Horsepower (S. A. E.)	29.40	29.40	29.40	29.40	38.40	25.35	21.60	25.30	60.00	25.30
Platen Displacement	288.6	303.1	303.0	303.0	377.0	223.9	180.0	224.0	324.6	119.0
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-1-3's	6-L-Block	6-L-Block	6-L-Block	6-1-Sep.	6-1-Sep.
Who Makes Engine	Continental	Continental	Continental	Continental	Dorris	Continental	Falls	Continental	Hall-Scott	Franklin
Location of Valve	Side	Right	Right	Right	Head	Right	Left	L head	Head	Head
Type of Camshaft Drive	Helical	Gear	Gear	Gear	Hel gear	Helical	Helical	Helical	Special	Helical
Type of Cooling System	Pump	Pump	Pump	Pump	Centrifugal	Pump	Ther.-Syp.	Pump	Special	Alr
Lubrication System	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	Force feed	F. F. & Spl.	Ther.-Syp.	F. F. & Spl.	Force F.	Force feed
Type of Pump	Centrifugal	Plunger	Plunger	Plunger	Twin gear	Plunger	Plunger	Plunger	Gear	Gear
Ignition System	Delco	Single	Single	Single	Bosch magnetos	Single	Single	Single	Dual	Single
Make and Control	Delco, H. & A. Bosch	Delco, hand	Delco, H. & A. Bosch	Delco, H. & A. Bosch	At Kent, hand	At Kent, hand	At Kent, hand	Conn., hand	Special	At Kent, auto.
Method of Fuel Feed	Miller	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Zenith spec.	Franklin
Starting System	West	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Light. Sys., Make, Volt	Dyneto	Delco	Delco	Delco	Westinghouse	Dyneto	Wagner	Auto-Lite	Bosch	Dyneto
Type, Make of Clutch	Disc	Disc	Disc	Disc	Disc	Disc	Wagner	Auto-Lite	Bosch	Dyneto
Type, Make of Gearset	Disc	Disc	Disc	Disc	Disc	Disc	Wagner	Auto-Lite	Bosch	Dyneto
Speed Ratios	Four one-half	Three	Three	Three	Three	Three	Three	Three	Three	Four
Drive Through	Torque arm	% floating	% floating	% floating	% floating	% floating	% floating	% floating	% floating	% floating
Type, Make Rear Axle	% floating	4.58-1	4.42-1	4.43-1	4.08-1	4.50-1	4.50-1	4.50-1	5.00-1	4.33-1
Direct Drive Ratio	125 in.	122 1/2 in.	124 in.	124 in.	130 in.	116 in.	117 in.	120 in.	135, 145 in.	116 in.
Wheelbase	33x4	32x4, F. & R.	34x4 1/2, F. & R.	34x4 1/2, F. & R.	36x4 1/2, F. & R.	33x4	33x4	34x4	34x4 1/2, F. & R.	33x4 1/2
Slack of Tires	33x4	Wood	Wood	Wood	Wood, wire	Wood	Wood	Wood	Wire	Wood
Wheels (Wood or Wire)	Wood	% elliptic	% elliptic	% elliptic	% platform	% elliptic	Cantilever	% elliptic	% elliptic	Full elliptic
Type of Rear Springs	Cantilever	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Drive and Control	Left, centre	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Type Gearset Bearings	Ball	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Ball
Rear Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Ball
Front Axle Bearings	Cup and cone	Three	Three	Three	Seven	Three	Three	Cup and cone	Seven	Seven
No. Eng. Main Bearings	Three	Three	Three	Three	Seven	Three	Three	Three	Seven	Seven

Name of Car	Geronimo
No. or Name of Model	6A 45
Price	\$1395
Bore and Stroke	3.50x5.00
Horsepower (S. A. E.)	23.44
Platen Displacement	230.0
Cylinders, Shape, Cast	6-L-Block
Who Makes Engine	Rutenber
Location of Valve	Right
Type of Camshaft Drive	Spiral gear
Type of Cooling System	Pump
Lubrication System	F. F. & Spl.
Type of Pump	Plunger
Ignition System	Battery
Make and Control	Delco, Lewis
Method of Fuel Feed	Stromberg
Starting System	Vacuum
Light. Sys., Make, Volt	Dyneto
Type, Make of Clutch	Disc. B. & B.
Type, Make of Gearset	S-Unit, M
Speed Ratios	Three
Drive Through	Springs
Type, Make Rear Axle	Walker
Direct Drive Ratio	4.50-1
Wheelbase	122 in.
Slack of Tires	32x4
Wheels (Wood or Wire)	Optional
Type of Rear Springs	% elliptic
Drive and Control	Centre
Type Gearset Bearings	Ball
Rear Axle Bearings	Roller
Front Axle Bearings	Ball
No. Eng. Main Bearings	Three



Above, Stutz Roadster; Below, Cadillac Touring Car.

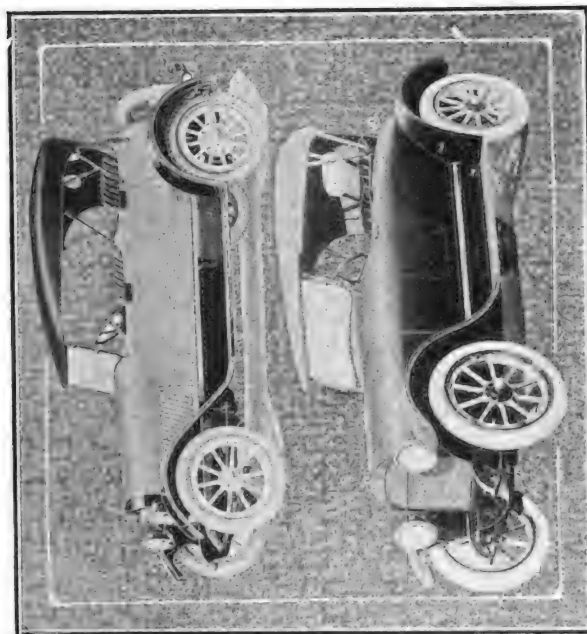
Name of Car	Grant Six	Glide	Glean	Haynes L. Six	Holler
No. or Name of Model	G	6-40	6-40	38 and 39	208
Price	\$1055	\$1495	\$1495	\$1725, \$1825	.....
Bore and Stroke	3.00x4.25	3.125x5.000	3.50x5.25	3.50x4.50	3.25x4.50
Horsepower (S. A. E.)	21.60	23.40	29.40	26.30	25.30
Platen Displacement	180.0	230.0	303.1	288.6	224.0
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Grant, Falls	Rutenber	Continental	Haynes	Continental
Location of Valve	Overhead	Right	Head	Right	Head
Type of Camshaft Drive	Helical	Helical	Helical	Helical	Helical
Type of Cooling System	Ther.-Syp.	Pump	Pump	Pump	Ther.-Syp.
Lubrication System	F. F. & Spl.	F. F. & Spl.	F. F. & Spl.	Splash	F. F. & Spl.
Type of Pump	Plunger	Plunger	Centrifugal	Plunger	Gear
Ignition System	Single	Single	Single	Single	Single
Make and Control	Remy, auto.	West, hand	Conn., hand	Remy, auto.	Remy, auto.
Method of Fuel Feed	Stromberg	Rayfield	Stromberg	Stromberg	Stewart
Starting System	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Light. Sys., Make, Volt	Wagner	Westinghouse	West, 6	Leece-Neville	Splitdorf
Type, Make of Clutch	Disc	Disc	Disc	Leece-Neville	Splitdorf
Type, Make of Gearset	S-Unit, M	S-Unit, M	S-Unit, M	S-Unit, M	S-Unit, M
Speed Ratios	Three	Three	Three	Three	Three
Drive Through	Torque tube	Springs	% floating	Springs	Springs
Type, Make Rear Axle	F. F., Peru	% floating	% floating	% floating	% floating
Direct Drive Ratio	4.50-1, 4.25-1	4.64-1	4.57-1	4.50-1	4.50-1
Wheelbase	121 in.	119 in.	125 in.	121, 127 in.	116 in.
Slack of Tires	32x3 1/2	32x3 1/2	34x4 1/2	34x4, 35x4 1/2	32x4
Wheels (Wood or Wire)	Wood	Wood	Wood	Wood	Wood
Type of Rear Springs	% elliptic	% elliptic	% elliptic	% elliptic	% elliptic
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Ball	Ball	Ball	Ball	Ball
Rear Axle Bearings	B. & R.	Roller	Roller	Roller	Ball
Front Axle Bearings	Roller	Roller	Roller	Roller	Ball
No. Eng. Main Bearings	Three	Three	Three	Three	Three

SPECIFICATIONS OF 1918'S SIX-CYLINDER PASSENGER CARS.

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

Name of Car	Jones	Jordan	Kissel	Kline	Lenox
No. or Name of Model	28 B	Sixty	100 Point Six	6-38 G. A.	18
Price	\$1675	\$1995, \$3500	\$1295	\$1495	\$2650
Bore and Stroke	3.500x5.125	3.50x5.25	3.25x5.00	3.25x4.50	3.675x5.500
Horsepower (S. A. E.)	29.40	30.0	26.35	26.35	33.70
Piston Displacement	288.6	303.0	248.9	225.0	364.5
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Lewis	Continental	Kissel	Continental	Buda
Location of Valves	Side	Right	Right	Right	Side
Type of Camshaft Drive	Helical	Gear	Hel. gear	Helical	Helical
Type of Cooling System	Centrifugal	Pump	Centri. pump	Pump	Pump
Lubrication System	F. F., Spl.	F. F., Spl.	Splash	F. F., Spl.	Splash
Type of Pump	Gear	Plunger	Gear	Plunger	Gear
Ignition System	Single	Single	Single	Single	Single
Make and Control	Delco, H. & A.	Delco, H. & A.	West., hand	West., hand	Elsemann, H.
Method of Carburetor	Hudson	Stromberg	Stromberg	Rayfield	Zenith
Light. Sys., Make, Volt	Delco, 6	Auto-Lite, 6	Kissel, Remy	Westinghouse	Bijur
Type, Make of Clutch	Disc, Hudson	Disc, B. & B.	Remy, 6	Westinghouse	Bijur
Type, Make of Gearset	S-U., M. Hud.	S-U., M. Det.	Cone, Warner	Disc, B. & B.	Disc
Speed Ratios	Three	Three	S-U., M., War.	S-U., M.	Three
Drive Through	Three	Three	Three	Three	Three
Type, Make Rear Axle	1/2 F., Timken	1/2 F., Timken	Springs	Springs	Springs
Direct Drive Ratio	4.45-1	4.46-1	Kissel, float.	F. F., Hess	Full floating
Wheelbase	125 in.	127 in.	117 in.	120 in.	130 in.
Wheels (Wood or Wire)	35x4 1/2	35x4 1/2	34x4	34x4 1/2	34x4 1/2
Type of Rear Springs	1/2 elliptic	1/2 elliptic	Wood	Wood, wire	Wood
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Roller	Roller	Ball, plain	Ball	.....
Rear Axle Bearings	Roller	Roller	Roller	Roller	.....
Front Axle Bearings	Roller	Roller	Roller	Roller	.....
No. Eng. Main Bearings	Four	Three	Three	Three	Three

Above, Elcar E-4, E-6; Below, Moon Club Roadster.



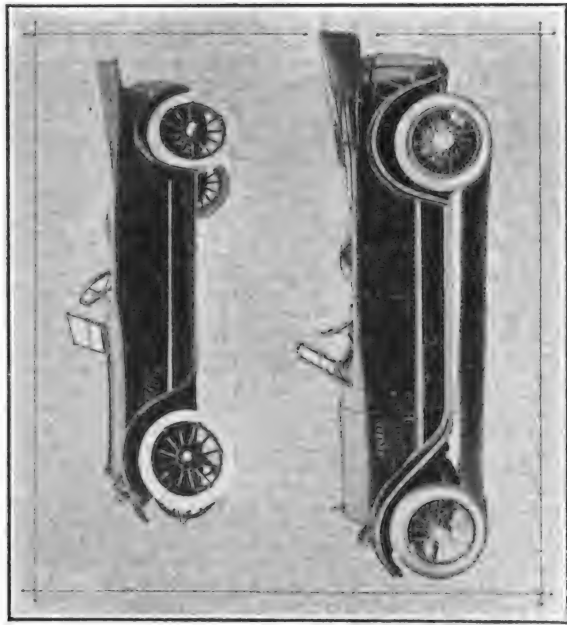
Name of Car	Lexington	Liberty	Locomobile	Locomobile	McFarlin Six	Madison	Malbohm	Marmion	Mitchell
No. or Name of Model	6-R	10-B	38, Series Two	45, Series Two	127	A and B	B	34	D 40
Price	\$1585	\$1350	\$5000	\$5950, \$7400	\$3500	\$1485	\$975	\$3550	\$1250, \$1950
Bore and Stroke	3.25x4.50	3.25x4.50	4.25x6.00	4.50x5.50	4.50x6.00	3.125x5.000	3.125x4.250	3.750x5.125	3.25x5.00
Horsepower (S. A. E.)	25.39	25.40	43.35	48.60	48.60	38.44	28.44	33.75	25.35
Piston Displacement	224.0	216.0	425.4	525.0	572.55	230.1	195.8	339.63	248.8
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-T-2s	6-T-2s	6-T-Block	6-L-Block	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Continental	Continental	Locomobile	Locomobile	Rutenber	Marmon	Marmon	Marmon	Mitchell
Location of Valves	Right	Right	R. & L.	R. & L.	Right	Head	Head	Head	Left
Type of Camshaft Drive	Helical	Helical	Helical	Helical	Helical	Helical	Helical	Helical	Helical
Type of Cooling System	Pump	Ther.-Syp.	Pump	Pump	Centrifugal	Ther.-Syp.	Ther.-Syp.	Pump	Pump
Lubrication System	F. F., Spl.	F. F., Spl.	F. F., Spl.	F. F., Spl.	F. F., Spl.	F. F. & Spl.	F. F. & Spl.	Force feed	Clr. splash
Type of Pump	Plunger	Plunger	Gear	Gear	Plunger	Plunger	Plunger	Plunger	Plunger
Ignition System	Single	Single	Tandem dual	Tandem dual	Duplex	Dual	Single	Single	Conn., hand
Make and Control	Conn., hand	Delco, hand	Berling, hand	Berling, hand	West., Elase, H.	Remy, hand	At. Kent, hand	Bosch, hand	Rayfield
Method of Carburetor	Rayfield	Stromberg	Loco., B. & B.	Loco., B. & B.	Stromberg	Rayfield	Stromberg	Stromberg	Vacuum
Starting System	Vacuum	Vacuum	Pressure	Pressure	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Light. Sys., Make, Volt	Westinghouse	Delco, 6	Westinghouse	Westinghouse	West., 6	Remy	Wagner, 6	Bosch	Splitdorf, 6
Type, Make of Gearset	S-U., M	S-U., M. Det.	Disc, own	Disc, own	Disc, B. & B.	Disc	Disc, B. & B.	Bosch	Splitdorf, 6
Type, Make of Gearset	S-U., M	S-U., M. Det.	Disc, own	Disc, own	Disc, B. & B.	S-U., M	S-U., M.	Conc.	Conc.
Speed Ratios	Three	Three	Four	Four	Three	Three	Three	Three	Three
Drive Through	Three	Three	Three	Three	Three	Three	Three	Three	Three
Type, Make Rear Axle	Full floating	1/2 F., Timken	Radius rods	Radius rods	F. F., Timken	Full floating	Full floating	Torque tube	Springs
Direct Drive Ratio	5.00-1	4.75-1	3.85-1	3.85-1	3.50-1	4.64-1	4.50-1	3.69-1	4.41-1
Wheelbase	115 in.	115 in.	139 in.	142 in.	136 in.	115, 120, 124 in.	115 in.	136 in.	120 in.
Wheels (Wood or Wire)	32x4, F. & R.	32x4	35x4 1/2	35x4 1/2	35x5	34x4, F. & R.	32x4 1/2	32x4 1/2	32x4 1/2
Type of Rear Springs	1/2 elliptic	1/2 elliptic	Wood	Wood	1/2 elliptic	Wood	Wood	Wire	Wood
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Ball	Ball	Ball	Ball	Roller	Ball	Ball	Roller	Roller
Rear Axle Bearings	Ball	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller
No. Eng. Main Bearings	Three	Three	Seven	Seven	Four	Three	Four	Four	Three

SPECIFICATIONS OF 1918'S SIX-CYLINDER PASSENGER CARS.

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

Name of Car	Pierce-Arrow	Pierce-Arrow	Pierce-Arrow	Pilot	Premier	Reo
No. or Name of Model	38-C-4	48-B-4	48-B-4	6-45	6 C	M
Price	\$4800	\$5500	\$5500	\$1295	\$2285	\$1385
Bore and Stroke	4.00x5.50	4.50x5.50	4.50x5.50	3.125x5.000	3.375x5.500	3.562x5.125
Horsepower (S. A. E.)	60.20	38.40	48.60	27.30	30.40	30.40
Piston Displacement	324.7	414.7	524.8	230.1	295.22	306.6
Cylinders, Shape, Cast	6-T-2s	6-T-2s	6-T-2s	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Pierce-Arrow	Pierce-Arrow	Pierce-Arrow	Tector	Premier	Reo
Location of Valves	R. & L.	R. & L.	R. & L.	Helical	Head	Side
Type of Camshaft Drive	Spur	Helical	Helical	Pump	Helical	Helical gear
Type of Cooling System	Pump	Pump	Pump	F. F., Spl.	F. F., Spl.	Pump
Lubrication System	Force feed	Force feed	Force feed	Helical	Helical	F. F., Spl.
Type of Pump	Gear	Gear	Gear	Plunger	Gear	Plunger
Ignition System	Double	Double	Double	Single	Single	Single
Make and Control	Bosch, hand	Bosch, hand	Bosch, hand	Delco, H. & A. Delco, auto	Delco, H. & A. Delco, auto	Reo, hand
Make of Carburetor	Pierce-Arrow	Pierce-Arrow	Pierce-Arrow	Tillotson	Tillotson	Rayfield
Method of Fuel Feed	Pressure	Pressure	Pressure	Vacuum	Vacuum	Vacuum
Starting System	Make. Westinghouse	Make. Westinghouse	Make. Westinghouse	Delco	Delco	Reo
Light. Sys., Make, Volt	Westinghouse	Westinghouse	Westinghouse	Delco	Delco	Reo
Type, Make of Clutch	Cone	Cone	Cone	Disc	Disc	Reo
Type, Make of Gearset	Selec. amid.	Selec. amid.	Selec. amid.	S-Unit, M	S-Unit, M	Selec., Reo
Speed Ratios	Four	Four	Four	Three	Three	Three
Drive Through	Springs	Springs	Springs	Floating	Floating	Torque arm
Type, Make Rear Axle	1/2 floating	1/2 floating	1/2 floating	4.50-1	4.50-1	Reo
Direct Drive Ratio	Optional	Optional	Optional	120 in.	125 1/2 in.	4.30-1
Wheelbase	147 1/2 in.	134 in.	142 in.	120 in.	125 1/2 in.	126 in.
Slashes of Tires	36x5 1/2, F. & R.	36x5 1/2, F. & R.	36x5 1/2, F. & R.	32x4 1/2	32x4 1/2	31x4 1/2
Wheels (Wood or Wire)	Wood	Wood	Wood	Wood	Wood	Wood
Type of Rear Springs	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Drive and Control	Right	Right	Right	Ball	Ball	Left, centre
Type Gearset Bearings	Ball	Ball	Ball	Roller	Roller	Roller
Rear Axle Bearings	B. & R.	B. & R.	B. & R.	Roller	Roller	Roller
Front Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller
No. Eng. Main Bearings	Seven	Seven	Seven	Three	Three	Three

Above, Jackson Eight; Below, Mercer Sporting Model.

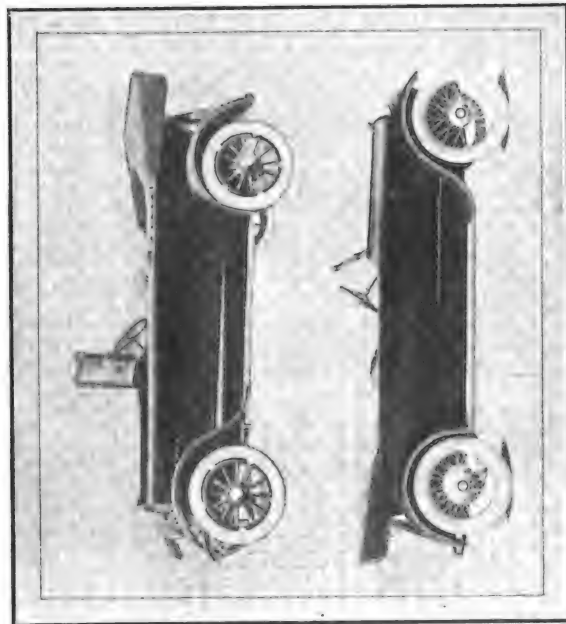


Name of Car	Saxon	Saxons	Scrapps-Booth	Scrapps-Booth	Singer	Stephens	Studebaker	Studebaker	Velle-Biltwel
No. or Name of Model	S 4	Saxons	Six 39, Six 40	Six 40	18	70, 74, 75, 78	Light Six	Big Six	38
Price	\$935	\$1295	\$1250	\$1495	\$3800	\$1485	.....	.....	\$1340
Bore and Stroke	2.875x4.500	3.25x4.50	2.812x4.750	2.812x4.750	4.00x5.50	3.25x4.50	3.50x5.00	3.875x5.000	3.25x4.50
Horsepower (S. A. E.)	19.84	25.35	21.70	21.70	38.40	25.40	29.40	36.04	25.35
Piston Displacement	175.3	224.0	170.9	170.9	414.7	224.0	318.63	363.8	224.0
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-V-Block	6-V-Block	6-T-2s	6-L-Block	6-L-Block	6-L-Block	6-L-Block
Who Makes Engine	Duesenberg	Continental	Mason	Mason	H-Spl.	Own	Studebaker	Studebaker	Continental
Location of Valves	Right	Side	Head	Head	R. & L.	Head	Left	Left	Right
Type of Camshaft Drive	Helical	Helical gear	Helical	Helical	Helical	Helical	Helical	Helical	Helical
Type of Cooling System	Ther.-Syp.	Pump	Centrifugal	Centrifugal	Pump	Ther.-Syp.	Pump	Pump	Pump
Lubrication System	Splash	F. F., Spl.	Force feed	Force feed	Force feed	Force feed	F. F., Spl.	F. F., Spl.	F. F., Spl.
Type of Pump	Plunger	Plunger	Gear	Gear	Gear	Gear	Gear	Gear	Plunger
Ignition System	Single	Single	Single	Single	Single	Single	Single	Single	Dual
Make and Control	Reo, hand	Reo, hand	Reo, auto	Reo, auto	Bosch, hand	Delco, hand	Reo, hand	Reo, hand	Reo, auto
Make of Carburetor	Ray, or Strom.	Delco, H. & A. Delco, auto	Marvel	Marvel	Rayfield	Stromberg	Vacuum	Vacuum	Rayfield
Starting System	Wagner	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Light. Sys., Make, Volt	Wagner	Delco	Reo, 6	Reo, 6	Westinghouse	Delco, 6	Stude, Wag.	Stude, Wag.	Reo
Type, Make of Clutch	Disc	Delco, 6	Reo, 6	Reo, 6	Disc	Delco, 6	Stude, Wag.	Stude, Wag.	Reo
Type, Make of Gearset	S-Unit, X	Disc, B. & B.	Cone	Cone	S-Unit, M	Disc, B. & B.	Cone	Cone	S-Unit, M
Speed Ratios	Three	.....	Three	Three	Four	S-Unit, M	Selec., amid	Selec., amid	Disc
Drive Through	Torque rod	Springs	Springs	Springs	Four	Springs	Three	Three	Three
Type, Make Rear Axle	1/2 floating	Floating	Full floating	Full floating	Full floating	Full floating	1/4 floating	1/4 floating	1/4 floating
Direct Drive Ratio	4.75-1	.....	4.80-1	4.80-1	4.80-1	4.75-1	4.00-1	4.75-1	4.75-1
Wheelbase	112 in.	112 in.	112 in.	112 in.	136 in.	117 1/2 in.	119 in.	126 in.	116 in.
Slashes of Tires	38x3 1/2, F. & R.	38x3 1/2, F. & R.	32x4	32x4	35x5, F. & R.	32x4	32x4	38x4 1/2	32x4, F. & R.
Wheels (Wood or Wire)	Wire	Wood	Wood	Wood	Wood	Wood	Wood	Wood	Wood
Type of Rear Springs	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Plain	Plain	Ball	Ball	Ball	Ball	Roller	Roller	Ball
Rear Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller
Front Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller
No. Eng. Main Bearings	Three	Three	Three	Three	Three	Three	Four	Four	Three

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

Name of Car	Westcott	Willis-Six	Winton	Winton	Apperson	Cadillac	Chevrolet	Cole Eight	Cunningham
No. or Name of Model	Series 18	89	33	48	8-18	Type 57	Eight Cylinder	870, 71, 72	V
Price	\$1940	\$1365	\$2950	\$3500	\$2300	\$2805	\$1385	\$2395	\$4750
Bore and Stroke	3.50x5.25	3.50x5.25	3.75x5.25	4.50x5.50	\$2550.00	3.125x5.125	3.375x4.000	3.50x4.50	3.75x5.00
Piston Displacement	303.0	303.0	337.9	524.8	332.0	314.0	286.0	39.22	46.00
Cylinders, Shape, Cast	6-L-Block	6-L-Block	6-L-2s	6-L-2s	8-L-Block	8-L-Block	8-L-Block	8-L-4s	8-L-4s
Who Makes Engine	Continental	Continental	Winton	Winton	Apperson	Cadillac	Northway	Cunningham	Cunningham
Location of Valves	Right	Right	Right	Right	Side	Inside	Inside	Left	Left
Type of Camshaft Drive	Helical	Helical	Chain	Chain	Gear	Chain	Helical	Helical	Helical
Type of Cooling System	Pump	Pump	Pump	Pump	Ther.-Syp.	Pump	Pump	Pump	Pump
Lubrication System	F. F. & Spl.	F. F. & Spl.	Force feed	Force feed	Force feed	Force feed	Splash	Force feed	Force feed
Type of Pump	Plunger	Plunger	Plunger	Plunger	Gear	Gear	Kellogg	Gear	Gear
Ignition System	Single	Single	Single	Single	Dual	Single	Delco	Single	Single
Make and Control	Delco, H. & A. Conn.	Delco, H. & A. Conn.	Delco, Bosch, hand	Delco, Bosch, hand	Remy	Delco, H. & A. Rem.	Northway	Delco, H. & A.	Delco, H. & A.
Method of Carburetor	Rayfield	Rayfield	Rayfield	Rayfield	Johnson	Cadillac	Zenith	Stromberg	Stromberg
Method of Fuel Feed	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Pressure	Vacuum	Vacuum	Vacuum
Starting System	Delco, 6	Delco, 6	Delco, 6	Delco, 6	Delco, 6	Delco, 6	Delco, 6	Delco, 6	Delco, 6
Light. Sys., Make, Volt	Disc	Disc	Disc	Disc	Disc	Disc	Disc	Disc	Disc
Type, Make of Clutch	S-Unit, M	S-Unit, X	S-Unit, M	S-Unit, M	Disc, own	Disc	Cone, own	Cone, North.	S-Unit
Type, Make of Gearset	S-Unit, M	S-Unit, M	S-Unit, M	S-Unit, M	Disc, own	Disc	Cone, own	Cone, North.	S-Unit
Speed Ratios	Three	Three	Four	Four	Three	Three	Three	Three	Three
Drive Through	Springs	Torque rod	Springs	Springs	Springs	Springs	Springs	Springs	Springs
Type, Make Rear Axle	% floating	Full floating	Full floating	Full floating	Demount., own	own F. F. Timken	% F. F. Timken	Columbia	F. F. Timken
Direct Drive Ratio	4.46-1	4.66-1	4.46-1	4.46-1	4.25-1	4.43-1	4.25-1	4.45-1	4.09-1
Wheelbase	124 in.	120 in.	128 in.	138 in.	120 in.	125, 132 in.	120 in.	127 in.	132, 142 in.
Sizes of Tires	35x4 1/4, F. & R.	35x4 1/4, F. & R.	35x4 1/4, F. & R.	35x4 1/4, F. & R.	35x5, 34x4 1/2	35x5, 34x4 1/2	35x5, 34x4 1/2	35x5	35x5
Wheels (Wood or Wire)	Wood	Wood	Optional	Optional	Wood	Wood	Wood	Wood	Optional
Type of Rear Springs	% elliptic	Cantilever	% elliptic	% elliptic	% elliptic	Platform	% cantilever	% elliptic	% elliptic
Drive and Control	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Ball	Ball	B. & R.	B. & R.	Roller	B. & R.	Ball, plain	B. & R.	Roller
Rear Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller	Roller
Front Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller	Cup and cone	Roller	Roller
No. Eng. Main Bearings	Three	Three	Four	Four	Three	Three	Three	Three	Three

Name of Car	Danels
No. or Name of Model	B
Price	\$3100
Bore and Stroke	3.25x5.00
Horsepower (S. A. E.)	33.80
Piston Displacement	331.8
Cylinders, Shape, Cast	8-L-Block
Who Makes Engine	Her.-Spillman
Location of Valves	Inside
Type of Camshaft Drive	Helical
Type of Cooling System	Pump
Lubrication System	Force feed
Type of Pump	Gear
Ignition System	Single
Make and Control	West, hand
Method of Carburetor	Zenith
Method of Fuel Feed	Vacuum
Starting System	Westinghouse
Light. Sys., Make, Volt	West, 6
Type, Make of Clutch	Disc, B. & B.
Type, Make of Gearset	S-Unit, M
Speed Ratios	Three
Drive Through	Springs
Type, Make Rear Axle	% floating
Direct Drive Ratio	4.42-1
Wheelbase	127 in.
Sizes of Tires	34x4 1/4, F. & R.
Wheels (Wood or Wire)	Wood
Type of Rear Springs	% elliptic
Drive and Control	Left, centre
Type Gearset Bearings	B. & R.
Rear Axle Bearings	Roller
Front Axle Bearings	Roller
No. Eng. Main Bearings	Three



Above, Regal Hi-Power Four; Below, Matbom Model B.

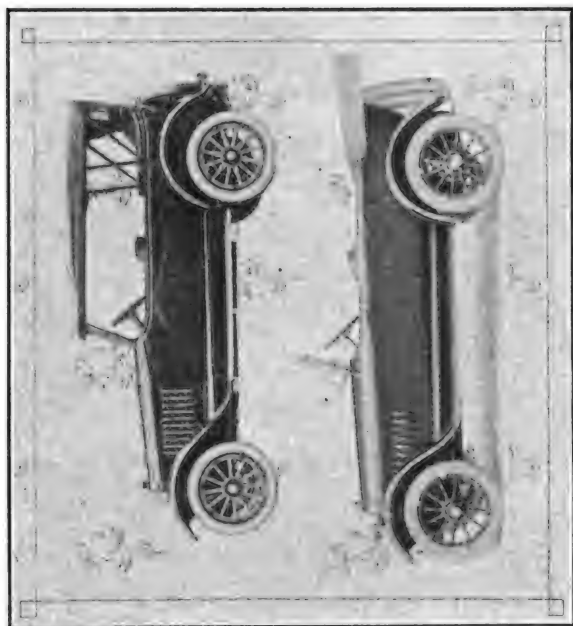
Name of Car	Holler	Jackson	King
No. or Name of Model	188	249	EE
Price	\$1285	\$1495, \$2195	.....
Bore and Stroke	3.00x3.50	3.00x3.50	3.00x5.00
Horsepower (S. A. E.)	28.80	28.80	28.80
Piston Displacement	240.3	198.0	282.6
Cylinders, Shape, Cast	8-L-Block	8-L-Block	8-L-4s
Who Makes Engine	Own	Ferro	King
Location of Valves	Inside	Head	Inside
Type of Camshaft Drive	Helical	Helical	Chain
Type of Cooling System	Ther.-Syp.	Ther.-Syp.	Ther.-Syp.
Lubrication System	Pressure	Force feed	Force feed
Type of Pump	Gear	Gear	Gear
Ignition System	Single	Single	Single
Make and Control	Atwater	Kent A. L., 1/2 auto.	At. Kent, hand
Method of Carburetor	Stewart	Zenith	Ball & Ball
Method of Fuel Feed	Vacuum	Vacuum	Vacuum
Starting System	Apico	Apico	Apico
Light. Sys., Make, Volt	Dyneto, 6	Auto-Lite, 6	Auto-Lite, 6
Type, Make of Clutch	Disc, B. & B.	Disc	Disc
Type, Make of Gearset	S-Unit, M	S-Unit, M	S-U., M., covert
Speed Ratios	Three	Three	Three
Drive Through	Springs	Springs	Springs
Type, Make Rear Axle	% floating	% F. F. Salls.	% F. F. Columbia
Direct Drive Ratio	4.50-1	4.50-1	4.58-1, 5.00-1
Wheelbase	116 in.	118 in.	120 in.
Sizes of Tires	32x4	34x4	34x4
Wheels (Wood or Wire)	Wood	Optional	Wood
Type of Rear Springs	% elliptic	Elliptic	Cantilever
Drive and Control	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Ball	Roller	B. R. P.
Rear Axle Bearings	Roller	Roller	Roller
Front Axle Bearings	Roller	Roller	Roller
No. Eng. Main Bearings	Three	Three	Three

THE EIGHT-CYLINDER PASSENGER CARS OFFERED FOR 1918.

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

Name of Car	Murray
No. or Name of Model	1918
Price	\$1467
Bore and Stroke	2.875x5.00
Horsepower (S. A. E.)	33.80
Platon Displacement	331.8
Cylinders, Shape, Cast	8-V-Block
Who Makes Engine	H.-Spill
Location of Valves	Inside
Type of Camshaft Drive	Gear
Type of Cooling System	Pump
Lubrication System	F. F., Spl.
Type of Pump	Gear
Ignition System Type	Single
Make and Control	Dixie
Make of Carburetor	Zenith
Method of Fuel Feed	Vacuum
Starting System Make	West.
Light, Sys. Make, Volt	West.
Type, Make of Clutch	Disc
Type, Make of Gearset	S-Unit, M
Speed Ratio	Three
Drive Thru-shaft	Springs
Type, Make Rear Axle	Full floating
Direct Drive Ratio	4.47-1
Wheelbase	128 in.
Sizes of Tires	34x4½, F. & R.
Wheels (Wood or Wire)	Wood
Type of Rear Springs	¼ elliptic
Drive and Control	Left, centre
Type Gearset Bearings	Roller
Rear Axle Bearings	Roller
Front Axle Bearings	Roller
No. Eng. Main Bearings	Three

Name of Car	Oldsmobile	Feetless	Scripps-Booth	Standard	Stearns-Knight
45-A	56	H	G	S	K 8
Price	\$2340	\$1585	\$2450	\$2575	\$2575
Bore and Stroke	3.125x5.000	2.875x5.000	3.25x5.00	3.25x5.00	3.25x5.00
Horsepower (S. A. E.)	26.40	32.80	33.80	33.80	33.80
Platon Displacement	246.7	331.8	162.0	531.8	331.8
Cylinders, Shape, Cast	8-L-4s	8-V-4s	Her.-Spill	8-V-Block	8-V-Block
Who Makes Engine	Oldsmobile	Feetless	Perro	Stearns	Stearns
Location of Valves	Inside	Inside	Head	Sleeve	Sleeve
Type of Camshaft Drive	Helical	Helical	Helical	Chain	Chain
Type of Cooling System	Pump	Centrifugal	Ther.-Syp.	Pump	Ther.-Syp.
Lubrication System	Force feed	Force feed	Full floating	Force feed	F. F., Spl.
Type of Pump	Gear	Gear	Gear	Gear	Gear
Ignition System Type	Single	Single	Single	Single	Single
Make and Control	Delco, H. & A.	At. Kt., H. & A.	Remy, hand	Spitdorf, H.	Remy, hand
Make of Carburetor	Johnson	Ball & Ball	Zenith	Zenith	Rayfield
Method of Fuel Feed	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Starting System Make	Delco	Auto-Lite	Wagner	Westinghouse	Westinghouse
Light, Sys. Make, Volt	Delco	Auto-Lite, 6	Wagner, 6	West, 6	West, 12
Type, Make of Clutch	Cone	Disc, B-L	D., Goodspeed	Disc, B. & B.	Disc
Type, Make of Gearset	S-Unit, M	S-U., M., B.	Selec., Warner	S-U., M., G.	L.S.-Unit, M
Speed Ratio	Three	Three	Three	Three	Three
Drive Thru-shaft	Springs	Torque rod	Springs	Springs	Springs
Type, Make Rear Axle	Full floating	¼ F., Timken	¼ F., Timken	¼ float, St.	¼ float, St.
Direct Drive Ratio	4.91-1	4.30-1	5.33-1	4.45-1	4.75-1
Wheelbase	120 in.	125 in.	120 in.	127 in.	125 in.
Sizes of Tires	34x4½, F. & R.	36x4½	32x4	34x4½	25x4½, F. & R.
Wheels (Wood or Wire)	Wood	Wood	Wire	Wood	Wood
Type of Rear Springs	¼ elliptic	Platform	Cantilever	¼ elliptic	Cantilever
Drive and Control	B. & R.	Left, centre	Left, centre	Left, centre	Left, centre
Type Gearset Bearings	Roller	B. & R.	B. & P.	R. & B.	B. & R.
Rear Axle Bearings	Roller	Roller	Roller	Roller	Roller
Front Axle Bearings	Roller	Roller	Roller	Roller	Roller
No. Eng. Main Bearings	Three	Two	Two	Three	Three



Above, Chalmers 6-30; Below, Empire Touring Car.

Name of Car	Willis-Knight	Vale	8
No. or Name of Model	88-S	M	
Price	\$2000	\$1950	
Bore and Stroke	3.375x4.000	3.00x5.00	
Horsepower (S. A. E.)	45.00	28.80	
Platon Displacement	450.0	282.4	
Cylinders, Shape, Cast	8-V-Block	8-V-Block	
Who Makes Engine	Willis-Knight	Tur. & Moore	
Location of Valves	Steeves	Inside	
Type of Camshaft Drive	Chain	Chain	
Type of Cooling System	Ther.-Syp.	Ther.-Syp.	
Lubrication System	Force feed	Clr. splash	
Type of Pump	Plunger	Plunger	
Ignition System Type	Single	Single	
Make and Control	Remy, hand	Remy, hand	
Make of Carburetor	Zenith	Zenith	
Method of Fuel Feed	Vacuum	Vacuum	
Starting System Make	Auto-Lite	Dyneto	
Light, Sys. Make, Volt	Auto-Lite	Dyneto, 6	
Type, Make of Clutch	Cone	Disco, B. & B.	
Type, Make of Gearset	S-Unit, X	S-Unit, M	
Speed Ratio	Three	Three	
Drive Thru-shaft	Torque tube	Springs	
Type, Make Rear Axle	Full floating	¼ F., Timken	
Direct Drive Ratio	4.66-1	4.45-1	
Wheelbase	125 in.	126 in.	
Sizes of Tires	34x4½, F. & P.	34x4	
Wheels (Wood or Wire)	Wood	Wood	
Type of Rear Springs	Cantilever	¼ elliptic	
Drive and Control	B. & R.	Left, centre	
Type Gearset Bearings	Roller	Ball	
Rear Axle Bearings	Roller	B. & R.	
Front Axle Bearings	Roller	Roller	
No. Eng. Main Bearings	Two	Three	

Name of Car	Austin	The Hal	Haynes	Kissel	National	Packard
No. or Name of Model	Highway King	25	12	Double Six	Highway 12	3-25
Price	\$3750	\$3500	.....	\$2250	\$2595	\$4100
Bore and Stroke	2.875x5.000	2.875x5.000	2.75x5.00	2.875x5.000	2.750x4.875	3.00x5.00
Horsepower (S. A. E.)	39.60	39.60	36.30	39.58	39.60	43.20
Platon Displacement	389.0	389.0	356.3	389.5	370.0	424.0
Cylinders, Shape, Cast	12-V-8s	12-V-8s	12-V-8s	12-V-8s	12-V-6s	12-V-6s
Who Makes Engine	Weldely	Weldely	Haynes	Kissel	Own	Packard
Location of Valves	Head	Head	Head	Head	Outside	Inside
Type of Camshaft Drive	Helical	Helical	Chain	Helical	Helical	Chain
Type of Cooling System	Pump	Pump	Pump	Centrifugal	Centrifugal	Centrifugal
Lubrication System	Force feed	Force feed	Force feed	Force feed	Force feed	Force feed
Type of Pump	Plunger	Plunger	Gear	Gear	Gear	Gear
Ignition System Type	Two unit	Single	Single	Single	Single	Single
Make and Control	Delco, hand	Delco, H. & A.	Delco, H. & A.	Delco	Delco	Delco
Make of Carburetor	Stromberg	Stromberg	Rayfield	Stromberg	Rayfield	Packard
Method of Fuel Feed	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Pressure
Starting System Make	Delco	Westinghouse	Leece-Neville	Delco	Bljur	Packard-Bljur
Light, Sys. Make, Volt	Delco, 6	West, 6	Leece-Neville	Delco, 6	Bljur, 7	P. B., 6-8
Type, Make of Clutch	Disc, Muncie	Disc, Warner	Disc	Disc, Warner	Cone, own	Disc
Type, Make of Gearset	Selec. Muncie	S-U., M., War.	S-Unit, M	Selec., Warner	S-Unit, M	S-Unit, M
Speed Ratio	6 F., 2 R.	Three	Three	Three	Three	Three
Drive Thru-shaft	Torque tube	Springs	Springs	Springs	Torque arm	Torque arm
Type, Make Rear Axle	Full floating	¼ F., Austin	¼ floating	F. F., Kissel	Packard, ¼ el.	Packard, ¼ el.
Direct Drive Ratio	4.45-1	4.75-1, 5.25-1	4.42-1	4.58-1	4.59-1	4.36-1
Wheelbase	126 in.	142 in.	135 in.	128 in.	128 in.	136 in.
Sizes of Tires	34x4½	34x4½	34x4½	34x4½	35x5	35x5
Wheels (Wood or Wire)	Wood	Wood	Wire	Wood	Wood	Wood
Type of Rear Springs	D. cant.	¼ elliptic	¼ elliptic	¼ elliptic	Centilever	¼ elliptic
Drive and Control	B. & R.	Left, centre	Left, centre	Left, centre	Centre	Left, centre
Type Gearset Bearings	Roller	Ball	Ball	Ball, Roller	Ball	Ball
Rear Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller
Front Axle Bearings	Roller	Roller	Roller	Roller	Roller	Roller
No. Eng. Main Bearings	Two	Four	Three	Three	Three	Three

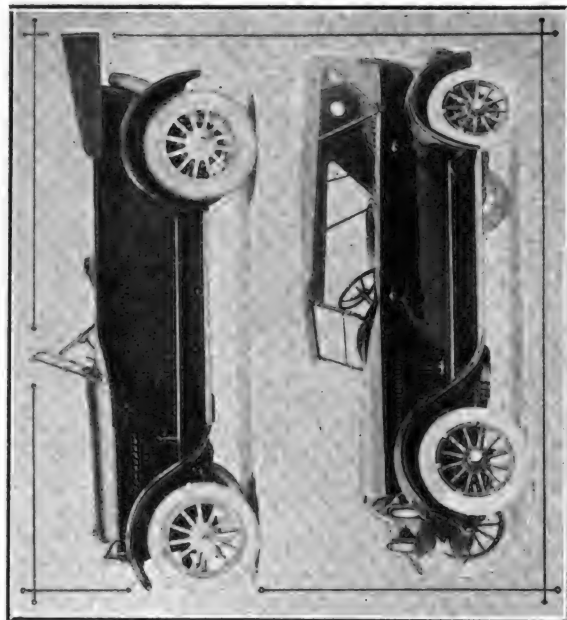
THE ELECTRIC PASSENGER CAR MODELS PRESENTED FOR 1918.

General Price Lists, Data on Seating Capacities and Body Types Are Given in the Buyers' Index, Pages 42-46.

Name of Car	Detroit Electric	100 M. Fritchle	Hupp-Yeats
No. or Name of Model	Model 75	Colonial	4 Regent B
Price	\$2375	\$2940	\$1750
Miles Per Charge	65-100	65-100	75-90
Maximum Speed	23	22	16
Motor Type	Series	Compound	Series
Battery	Detroit Electric	Fritchle, lead	Exide
Controller Type	Lever	Drum	Barrel
Speeds Forward	Five	Five	Four
Drive to Rear Wheels	Gear	Worm	Worm
Rear Axle Type	Full floating	¾ floating	¾ floating
Tires, Rear	34x4½	34x3½	33x4
Steer, Control	Lever	Lever	Lever
Springs	F., el.; r., ½ el.	Elliptic	¾ elliptic
Wheels	Wire	Wire or wood	Wood
Wheelbase	100 in.	102 in.	100 in.

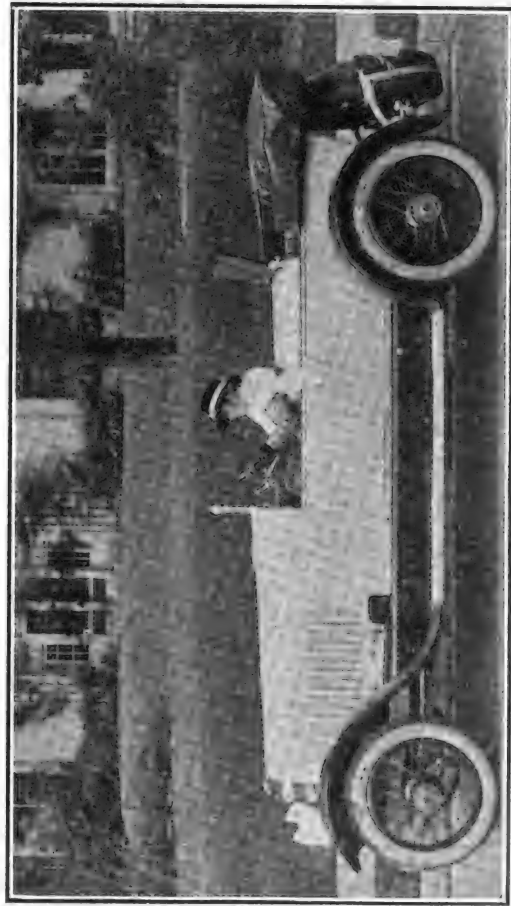
Name of Car	Ohio Electric	Ohio	Rauch & Lang
No. or Name of Model	44	63	Coach, Model J
Price	\$2680	\$3250	\$3200
Miles Per Charge	75-100	75-100	70-100
Maximum Speed	28	26	26
Motor Type	Series	Series	Compound
Battery	Optional	Optional	Exide or Phil.
Controller Type	Magnetic	Magnetic	Flat, own
Speeds Forward	Five	Five	Six
Drive to Rear Wheels	Helical bevel	Helical bevel	Worm gear
Rear Axle Type	Full floating	Full floating	Full floating
Tires, Rear	33x4½	34x4½	33x4½
Steer, Control	Lever	Lever	Lever
Springs	¾ elliptic	¾ elliptic	¾ elliptic
Wheels	Optional	Optional	Optional
Wheelbase	103 in.	103 in.	92 in.

Above, Paige 6-39; Below, Studebaker Big Six.



SPECIFICATIONS OF THE 1918 MAKES OF STEAM CARS.

Name of Car	Doble-Detroit	Stanley
Model	D	735-738
Price	\$3750	\$2600-\$2550
Wheelbase	135	130 in.
Type of Boiler	Water	Fire tube
Boiler Location	Under hood	Under hood
Type of Engine	Simple	Simple
Action of Engine	Double acting	Double
Type of Valve Gear	Doble	Slide
Type of Valves	Slide	Two
No. of Cylinders	Two	Two
Bore and Stroke	5x4	4x5
Location of Engine	Rear axle	Rear axle
Final Drive	Spur gear	Spur gear
Fuel Used	Kerosene	Kerosene
Fuel Control	Automatic	Automatic
Fuel Feed	Pressure	Pressure
Burner Type	Atomizing	Drill
Burner Action	Condensing	Vaporizing
Feed Water Control	Automatic	Automatic
Rear Axle Ratio	42 to 54	40 to 60
Car Drives Through	Springs	Engine frame
Torque Taken by	Ball	B. & R.
Rear Axle Bearings	Ball	Roller
Front Wheel Bearings	Ball	Roller
Wheels (Wire or Wood)	Wood	Wood
Rims	Firestone	Wire
Tires (Size)	35x5	25x4½
Electrical Equipment	Wagner	Apple



Doble Steam Car, 1918 Model.

Index of 1918 Cars, Body Styles and Prices

Gasoline Passenger Cars Listed Alphabetically According to Manufacturers' Names, with Index to Chassis Specifications

A				6-40	Convertible Sedan.....	6	5	1795	Chevrolet Motor Co., New York City.																						
Abbott Corp., Cleveland, O.				6-40	Roadster	6	4	1495	CHEVROLET																						
ABBOTT-DETROIT				Bell Motor Car Co., York, Pa.					CHASSIS, Pg. 30-31-39																						
Model Body Cyl. Pas. Price				BELL					Model Body Cyl. Pas. Price																						
6-44	Touring	6	7	\$1295	CHASSIS, Pg. 30				Four-Ninety Touring	4	5	\$635																			
6-60	Touring	6	7	1595	Model Body Cyl. Pas. Price				Four-Ninety Roadster	4	2	620																			
The Allen Motor Co., Fostoria, O.				18	Touring	4	5	\$995	Four-Ninety Sedan or Coupe	4	5-2	1060																			
ALLEN				Special Touring					4	5	1145	F A Touring	4	5	935																
Model Body Cyl. Pas. Price				Biddle Motor Car Co., Philadelphia, Pa.					F A Roadster	4	2	935																			
41	Touring	4	5	\$1095	BIDDLE				F A Sedan	4	5	1475																			
41	Roadster	4	4	1025	Model Body Cyl. Pas. Price				Eight Cyl. Touring	8	5	1385																			
41	Sedan	4	5	1395	H	Touring	4	4	\$2650	Eight Cyl. Roadster	8	4	1385																		
American Motors Corp., Plainfield, N. J.				Birch Motor Cars, Chicago, Ill.					Cole Motor Car Co., Indianapolis, Ind.																						
AMERICAN-SIX				BIRCH					COLE EIGHT																						
Model Body Cyl. Pas. Price				CHASSIS, Pg. 30-34					CHASSIS, Pg. 39																						
R	Touring	6	5	\$1375	Model Body Cyl. Pas. Price			Model Body Cyl. Pas. Price																							
E	Cloverleaf	6	4	1465	Super Four	Touring	4	5	\$895	860	Touring	8	7	\$1995																	
B	Speedster	6	2	1465	Super-Four	Chummy Road.	4	4	895	861	Tuxedo Foursome.....	8	4	1995																	
Anderson Motor Co., Rock Hill, S. C.				Light Six	Touring	6	5	1055	863				Tourcoupe	8	4	2495															
ANDERSON 6-40				Brewster & Co., Queensboro B. P., L. I. C.					864				4-Door Toursedan.....	8	7	2695															
Model Body Cyl. Pas. Price				BREWSTER					865				4-Door Toursedan	8	7	2595															
6-40	Touring	6	6	\$1435	Model Body Cyl. Pas. Price			CHASSIS, Pg. 30			866	4-Door Toursedan.....	8	8	2795																
Apperson Brothers Auto Co., Kokomo, Ind.				1	Chassis	4	2	\$5500	870			Tourster	8	7	2395																
APPERSON				1	Brewster Town Bghm.	4	2	8300	871			Roadster	8	2	2395																
Model Body Cyl. Pas. Price				1	Brewster Coun. Bghm.	4	4	8300	872			Sporster	8	4	2395																
8-18-7	Touring	8	7	\$2550	1	Brewster G. Q. Bghm.	4	4	8300	Columbia Motors Co., Detroit, Mich.																					
8-18-4	Roadster	8	4	2550	1	Brewster S. T. Land.	4	4	8400	COLUMBIA SIX																					
8-18-7	Touring	8	7	3200	1	Brewster L. T. Land.	4	4	8500	CHASSIS, Pg. 34																					
8-18-7	Touring	8	7	3400	1	Brewster Tour. Land.	4	4	8800	Model Body Cyl. Pas. Price																					
Auburn Automobile Co., Auburn, Ind.				1	Brewster Limousine.	4	4	8500	A				Touring	6	5	\$1350															
AUBURN				1	Brewster En. Drive.	4	6	8400	B				Sport model	6	4	1495															
Model Body Cyl. Pas. Price				1	Brewster Touring.	4	4	7700	Comet Automobile Co., Decatur, Ill.																						
6-39-B	Touring	6	5	\$1345	1	Brewster Runabout.	4	2-4	7200	COMET																					
6-39-B	Convertible Sedan.....	6	5	1545	Briscoe Motor Corp., Jackson, Mich.				CHASSIS, Pg. 35																						
6-39-E	Chummy Roadster.....	6	4	1345	BRISCOE				Model Body Cyl. Pas. Price																						
6-39-E	Chummy Coupe.	6	4	1495	CHASSIS, Pg. 30				Centennial Touring				6	5	\$1285																
6-39-S	Sport	6	4	1395	Model Body Cyl. Pas. Price				Commonwealth Motors Co., Chicago, Ill.																						
6-44	Touring	6	7	1685	Four-B24	Touring	4	5	\$725	COM'WEALTH U-4-F.																					
6-44	Convertible Sedan.....	6	7	1985	Four-B24	Roadster	4	4	725	CHASSIS, Pg. 30																					
6-44	Sedan	6	7	2450	Four-B24	Runabout	4	2	725	Model Body Cyl. Pas. Price																					
Austin Automobile Co., G. Rapids, Mich.				Buick Motor Co., Flint, Mich.					"Ultra-4-Forty" Touring				4	5	\$995																
AUSTIN				BUICK					"Ultra-4-Forty" Chum. Rd.				4	4	995																
Model Body Cyl. Pas. Price				CHASSIS, Pg. 34					Cortland Cart & Car Co., Sidney, N. Y.																						
36-66	Touring	6	5-6	\$3400	Model Body Cyl. Pas. Price			HATFIELD																							
36-66	Roadster	6	2-4	3400	E-24	Touring	4	5	\$880	CHASSIS, Pg. 31																					
48-66	Touring	6	5-6	4200	E-45	Touring	6	5	1361	Model Body Cyl. Pas. Price																					
48-66	Roadster	6	2-4	4200	E-49	Touring	6	7	1608	A				Touring	4	5	\$1080														
1918	Touring	12	5-6	3750	E-50	Sedan	6	7	2304	H				Roadster	4	2	950														
1918	Roadster	12	2-4	2750	Cadillac Motor Car Co., Detroit, Mich.				C				Roadster	4	4	1090															
1918	Coupe	12	5	4550	CADILLAC				C				Roadster De Luxe.....	4	4	1290															
1918	Sedan	12	7	4950	CHASSIS, Pg. 35-39				B				Speedster	4	2	950															
1918	Limousine	12	7	5250	Model Body Cyl. Pas. Price				I				Suburban	4	5	875															
B				57					Touring	8	7	\$2805	*Includes War Tax.																		
Baker R. & L. Co., Cleveland, O.				57					Phaeton	8	4	2805	Crawford Auto. Co., Hagerstown, Md.																		
OWEN-MAGNETIC				57					Roadster, convertible.	8	2	2805	CRAWFORD																		
Model Body Cyl. Pas. Price				57					Victoria, convertible.	8	4	3205	CHASSIS, Pg. 35																		
O-36-5	Touring	6	4	\$3750	57					Brougham	8	5	2650	Model Body Cyl. Pas. Price																	
O-36-4	Touring	6	7	3750	57					Town Limousine.	8	7	4100	18-6-40 Touring				6	5	\$2250											
O-36-6	Roadster	6	4	3750	57					Town Landaulet.	8	7	4310	Crow-Elkhart Motor Car Co., Elkhart, Ind.																	
O-36-3	Limousine	6	5	4800	57					Limousine	8	7	4145	CROW-ELKHART																	
O-36-7	Landaulet	6	5	5000	57					Imperial	8	7	4345	CHASSIS, Pg. 30																	
M-25-1	Coupe	6	3	3500	57					Landaulet	8	7	4295	Model Body Cyl. Pas. Price																	
M-25-3	Limousine	6	7	4200	57					Campbell Motor Car Co., Kingston, N. V.	C. E. Touring				4	5	\$935														
M-25-4	Touring	6	5	3150	57					CAMPBELL	C. E. Touring de luxe.....				4	5	945														
M-25-7	Landaulet	6	7	4400	57					CHASSIS, Pg. 30	C. E. Convertible sedan.....				4	4	1975														
W-42-4	Touring	6	7	5300	57					Model Body Cyl. Pas. Price	C. E. Cloverleaf				4	4	995														
W-42-3	Limousine	6	7	6300	57					..... Touring	4	5	\$835	J. Cunningham Son & Co., Rochester, N. Y.																	
W-42-2	Sedan	6	7	6200	57					J. I. Case T. M. Co., Racine, Wis.	CUNNINGHAM																				
Barley Motor Car Co., Kalamazoo, Mich.				CASE					CHASSIS, Pg. 33-34				Model Body Cyl. Pas. Price																		
ROAMER				Model Body Cyl. Pas. Price					U				Springfield Sedan.....	6	7	\$2375	V				Touring	8	7	\$4250							
Model Body Cyl. Pas. Price				U					Touring	6	7	1875	V				Closed	8	..	5500											
6-90	Touring	6	6	\$3150	U					Roadster	6	4	1875	V				Limousine	8	..	5500										
6-54	Touring	6	4	2095	U					Chalmers Motor Co., Detroit, Mich.	V				Town Car	8	..	5500													
6-54	Roadster	6	2-4	2295	CHALMERS					CHASSIS, Pg. 34-40				V				Touring	8	6	4750										
6-54	Town Car.....	6	..	3250	Model Body Cyl. Pas. Price			Six-30			Touring	6	5	\$1365	V				Roadster	8	4	4750									
6-54	Sedan	6	..	3250	Six-30			Touring	6	7	1450	Six-20			Duplex	6	4	1475	V				Inside Drive Limousine	8	6	6000					
6-54	Touring Sedan.....	6	..	2250	Six-30			Roadster	6	2-3	1365	Six-30			Speedster	6	2	2500	V				Cabriolet	8	6	6000					
6-45	Touring	6	4	1950	Six-30			Town Car	6	7	2925	Six-30			Limousine	6	7	2925	V				Town Car.....	8	6	6000					
6-45	Roadster	6	2-4	2150	Six-30			Limousine Land.....	6	7	3025	Six-30			Limousine Land.....	6	7	3025	D												
6-45	Town Car	6	..	3150	Six-30			Town Landaulet.....	6	7	3025	Six-30			Town Landaulet.....	6	7	3025	Daniels Motor Car Co., Reading, Pa.												
6-45	Standard Sedan.....	6	..	3150	Six-30			Touring Sedan.....	6	6	1850	Six-30			Touring Sedan.....	6	6	1850	DANIELS												
6-45	Touring Car	6	..	3150	Six-30			Cabriolet	6	3	1625	Six-30			Cabriolet	6	3	1625	CHASSIS, Pg. 39												
Bartholomew Co., Peoria, Ill.				Chandler Motor Car Co., Cleveland, O.					CHANDLER					Model Body Cyl. Pas. Price																	
GLIDE				CHANDLER					CHASSIS, Pg. 34					18					Touring	6	7	\$1595	Model Body Cyl. Pas. Price								
Model Body Cyl. Pas. Price				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Touring	8	7	\$3100	
6-40	Tourist	6	5	\$1495	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Roadster	8	2-3-4	3100
Baker R. & L. Co., Cleveland, O.				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100	
OWEN-MAGNETIC				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100	
Model Body Cyl. Pas. Price				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100	
O-36-5	Touring	6	4	\$3750	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
O-36-4	Touring	6	7	3750	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
O-36-6	Roadster	6	4	3750	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
O-36-3	Limousine	6	5	4800	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
O-36-7	Landaulet	6	5	5000	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
M-25-1	Coupe	6	3	3500	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
M-25-3	Limousine	6	7	4200	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
M-25-4	Touring	6	5	3150	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
M-25-7	Landaulet	6	7	4400	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
W-42-4	Touring	6	7	5300	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
W-42-3	Limousine	6	7	6300	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
W-42-2	Sedan	6	7	6200	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
Barley Motor Car Co., Kalamazoo, Mich.				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100	
ROAMER				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100	
Model Body Cyl. Pas. Price				18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100	
6-90	Touring	6	6	\$3150	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-54	Touring	6	4	2095	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-54	Roadster	6	2-4	2295	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-54	Town Car.....	6	..	3250	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-54	Sedan	6	..	3250	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-54	Touring Sedan.....	6	..	2250	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-45	Touring	6	4	1950	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-45	Roadster	6	2-4	2150	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf	8	4	3100
6-45	Town Car	6	..	3150	18					Speedster	6	4	1675	18					Speedster	6	4	1675	B					Cloverleaf ..			

F Sedan	4	5	1400
G Touring	4	7	1250
H Coupe	4	3	1400

Dixie Motor Car Co., Louisville, Ky.			
DIXIE FLYER	CHASSIS, Pg. 30		
Model Body	Cyl. Pas. Price		
L. S. 35 Touring	4	5	\$995
L. S. 35 Roadster	4	4	995
L. S. 35 Convertible sedan	4	5	1375

Dodge Brothers, Detroit, Mich.			
DODGE BROS. M. CAR	CHASSIS, Pg. 30		
Model Body	Cyl. Pas. Price		
..... Touring	4	5	\$885
..... Winter Touring	4	5	1050
..... Roadster	4	2	885
..... Winter Roadster	4	2	1050
..... Sedan	4	5	1350
..... Coupe	4	2	1350

Dorris Motor Car Co., St. Louis, Mo.			
DORRIS	CHASSIS, Pg. 25		
Model Body	Cyl. Pas. Price		
IC6 Touring	6	7	.....
IC6 Roadster	6	4	.....
IC6 Sedan	6	5	.....
IC6 Coupe	6	4	.....
IC6 Limousine	6	7	.....

Dort Motor Car Co., Flint, Mich.			
DORT	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
11 Touring	4	5	.....
11S Sedan	4	5	.....
11T Sedanet	4	5	.....
B-C Coupe	4	3	.....
B Roadster	4	3	.....

Douglas Motors Corp., Omaha, Neb.			
DOUGLAS EIGHT	CHASSIS, Pg. 39		
Model Body	Cyl. Pas. Price		
G5 Touring	8	5	\$2000
G7 Touring	8	7	2100
G4 Club Roadster	8	4	2000
G3 Standard Roadster	8	3	2000

Economy Motor Car Co., Tiffin, O.			
ECONOMY	CHASSIS, Pg. 30-39		
Model Body	Cyl. Pas. Price		
4-36 Touring	4	5	\$1040
8-48 Touring	8	7	1395

Elgin Motor Car Corp., Chicago, Ill.			
ELGIN SIX	CHASSIS, Pg. 35		
Model Body	Cyl. Pas. Price		
F Touring	6	5	\$1095
F Roadster	6	4	1095
F Sedan	6	5	1645

Elkhart Car. & Motor Car Co., Elkhart, Ind.			
ELKHART	CHASSIS, Pg. 31-35-36		
Model Body	Cyl. Pas. Price		
D-Four Touring	4	5	\$1095
E-Four Roadster	4	4	1095
G-Four Sedan	4	5	1625
D-Six Touring	6	5	1295
E-Six Roadster	6	4	1295
G-Six Sedan	6	5	1795

Empire Auto Co., Indianapolis, Ind.			
EMPIRE	CHASSIS, Pg. 31-35-40		
Model Body	Cyl. Pas. Price		
50 Touring	4	5	\$1125
51 Roadster (wire wheels)	4	2	1165
70A Touring	6	5	1345
70A Touring	6	7	1275
70S Sedan	6	5	1685
73 Roadster	6	4	1360

Erle Motor Co., Painesville, O.			
ERLE	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
33 Touring	4	5	\$975
34 Roadster	4	2	975

Fageol Motors Co., Oakland, Cal.			
FAGEOL	CHASSIS, Pg. 35		
Model Body	Cyl. Pas. Price		
100 Chassis	6	..	\$10,000

F. I. A. T., Poughkeepsie, N. Y.			
FIAT	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
'55-E Touring	4	7	.....
'55-E Limousine	4	7	.....

Ford Motor Co., Detroit, Mich.			
FORD	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
Model T Chassis	4	..	\$325
Model T Runabout	4	2	345
Model T Touring	4	5	360
Model T Coupe	4	2	560
Model T Town car	4	6	645
Model T Sedan	4	5	695
Model T Truck Chassis	4	..	600

H. H. Franklin Mfg. Co., Syracuse, N. Y.			
FRANKLIN	CHASSIS, Pg. 35		
Model Body	Cyl. Pas. Price		
Series 9 Touring	6	6	\$2050
Series 9 Roadster	6	4	2050
Series 9 Runabout	6	2	2000
Series 9 Cabriolet	6	3-1	2850
Series 9 Brougham	6	4	2900
Series 9 Sedan	6	5	2950
Series 9 Town Car	6	7	3200
Series 9 Limousine	6	7	2200

Geronimo Motor Co., Enid, Okla.			
GERONIMO	CHASSIS, Pg. 35		
Model Body	Cyl. Pas. Price		
6 A 45 Touring	6	5	\$1395
6 A 45 Touring	6	7	1450
6 A 45 Roadster	6	4	1450
6 A 45 Roadster	6	2	1395

Ghent Motor Co., Ottawa, Ill.			
GHEHT	CHASSIS, Pg. 35		
Model Body	Cyl. Pas. Price		
6-60 Touring	6	6	\$2160
6-60 Roadster	6	4	2160
6-60 Sedan	6	6	2750

Grant Motor Car Corp., Cleveland, O.			
GRANT	CHASSIS, Pg. 34-35		
Model Body	Cyl. Pas. Price		
G Touring	6	5	\$1055
G Roadster	6	3	1055
G Detachable Sedan	6	5	1350
G All-Weather Sedan	6	5	1595
G All-Weather Coupe	6	3	1575

Hackett Motor Car Co., Jackson, Mich.			
HACKETT	CHASSIS, Pg. 21		
Model Body	Cyl. Pas. Price		
..... Touring	4	5	\$960
..... Roadster	4	4	.....

Hal Motor Car Co., Cleveland, O.			
HAL-TWELVE	CHASSIS, Pg. 40		
Model Body	Cyl. Pas. Price		
25 Roadster	12	3	\$3500
25 Tour-roadster	12	4	3750
25 Touring	12	7	3500
25 Sedan	12	7	4500
25 Limousine	12	7	5000
25 Brougham	12	7	5000

Harroun Motors Corp., Detroit, Mich.			
HARROUN	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
AA-1 Touring	4	5	\$785

Harvard-Pioneer Motor Car Co., Troy, N. Y.			
HARVARD	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
4-25 Roadster	4	2	\$750
4-25 Cloverleaf	4	4	985

Haynes Automobile Co., Kokomo, Ind.			
HAYNES	CHASSIS, Pg. 35-40		
Model Body	Cyl. Pas. Price		
38 Touring	6	5	\$1725
29 Touring	6	7	1825
39 Fourdore Roadster	6	4	1825
39 Sedan	6	7	2585
39 Coupe	6	4	2535
39 Town car	6	5	3250
44 Touring	12	7	2785
44 Fourdore Roadster	12	4	2785
44 Sedan	12	7	3385
44 Coupe	12	4	3335
44 Town car	12	5	3985

Hudson Motor Car Co., Detroit, Mich.			
HUDSON	CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price		
Super-Six Phaeton	6	7	\$1950
Super-Six Phaeton	6	4	2050
Super-Six Runabout Land.	6	2	2350
Super-Six Foredoor Sedan	6	7	2350
Super-Six Tour. Limousine	6	7	2750
Super-Six Limousine	6	7	3400
Super-Six Lim. Landau	6	7	3500
Super-Six Town car	6	7	3400
Super-Six Town Car Landau	6	7	3500
Super-Six Full Fold. Landau	6	7	4250

Hupp Motor Car Co., Detroit, Mich.			
HUPMOBILE	CHASSIS, Pg. 30-31		
Model Body	Cyl. Pas. Price		
R Touring	4	5	\$1250
..... Touring	4	7	1385

Inter-State Motor Co., Muncie, Ind.			
INTER-STATE	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
T Touring	4	5	\$1000
TR Roadster	4	2	950
TR4 Roadster	4	4	1025

Jackson Automobile Co., Jackson, Mich.			
JACKSON	CHASSIS, Pg. 38-39		
Model Body	Cyl. Pas. Price		
349 Roadster	8	2	\$1495
349 Chummy Roadster	8	4	1495
349 Touring	8	5	1495
349 Touring	8	7	1570
349 Flyer	8	4	1575
349 Springfield Sedan	8	7	2195

Jones Motor Car Co., Wichita, Kan.			
JONES	CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price		
26B Touring	6	7	\$1675

Jordan Motor Car Co., Cleveland, O.			
JORDAN	CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price		
1918 Touring	6	7	\$1995
1918 Sport Model	6	4	1995
1918 Sedan	6	7	2750
1918 Brougham	6	4	3000
1918 Town car	6	6	3300
1918 Sport Limousine	6	7	3500
1918 Sport Marine	6	4	2375

King Motor Car Co., Detroit, Mich.			
KING	CHASSIS, Pg. 40		
Model Body	Cyl. Pas. Price		
EE Touring	8	7	.....
EE Sedan	8	7	.....
EE Roadster	8	3	.....
EE Foursome	8	4	.....

Kissel Motor Car Co., Hartford, Wis.			
KISSELKAR	CHASSIS, Pg. 32-36-40		
Model Body	Cyl. Pas. Price		

100 point 6 Touring	6	5	\$1295
100 point 6 Touring	6	5	1385
100 point 6 Sedan	6	5	1735
100 point 6 Roadster	6	3	1295
100 point 6 Roadster	6	4	1385
100 point 6 Coupe	6	4	1735
100 point 6 Victoria	6	5	2050
100 point 6 Sedanlet	6	4	1885
100 point 6 Sedanlet	6	4	1485
100 point 6 Sedan	6	5	1885
Double 6 Touring	12	7	2250
Double 6 Sedan	12	7	2650
Double 6 Coupe	12	4	2650
Double 6 Roadster	12	4	2250
Double 6 Sedan	12	4	2800
Double 6 Sedanlet	12	4	2350

Kline Car Corporation, Richmond, Va.			
KLINE KAR	CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price		
6-38 G. A. Touring	6	5	\$1495
6-38 G. A. Shamrock	6	4	1495
6-38 G. A. Sport	6	4	1495
6-38 G. A. Runabout	6	2-3	1495

Laurel Motor Car Co., Richmond, Ind.			
LAUREL	CHASSIS, Pg. 31		
Model Body	Cyl. Pas. Price		
55 Roadster	4	4	\$1095
55 Touring	4	5	1095

Lenox Motor Car Co., Boston, Mass.			
LENOX	CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price		
18 Touring	6	5	\$2650

The Lexington-Howard Co., Connersville, Ind.			
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LEXINGTON			
Model Body	Cyl. Pas. Price		
6-O Clubster	6	4	\$1395
6-O Coupe	6	4	1545
6-R Touring	6	5	1585

Lewis Spring & Axle Co., Chascon, Mich.			
HOLLIER	CHASSIS, Pg. 36-39		
Model Body	Cyl. Pas. Price		
206 Touring	6	5	.....
188 Touring	8	5	\$1295

Liberty Motor Car Co., Detroit, Mich.			
LIBERTY	CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price		
10-B Touring	6	5	\$1350
10-B Roadster	6	4	1350
10-B Roadster	6	2	1350
10-B Sedan	6	5	1925
10-B Brougham	6	6	2700
10-B Landulet	6	6	2700

The Locomobile Co. of America, Bridgeport, Conn.			
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LOCOMOBILE		CHASSIS, Pg. 30	
Model	Body	Cyl.	Pas. Price
38 Series 2	Touring	6	\$5000
38 Series 2	Touring	6	7 5000
38 Series 2	Touring	6	4 5150
38 Series 2	Limousine	6	6200
38 Series 2	Landaulet	6	6300
38 Series 2	Berline	6	6400

38 Series 2 Chassis	6	4350
48 Series 2 Touring	6	5950
48 Series 2 Touring	6	5950
48 Series 2 Touring	6	6050
48 Series 2 Limousine	6	7200
48 Series 2 Landaulet	6	7300
48 Series 2 Chassis	6	5100
48 Series 2 Berline	6	7400

All Prices Plus 3% War Tax.

Louverne Automobile Co., Louverne, Minn.		
LUVERNE CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price	
760 Touring	6	\$1650
760 Roadster	6	2 1650

McFarlan Motor Co., Connersville, Ind.		
MCFARLAN SIX CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price	
123 Roadster	6	2 \$3500
123 Roadster	6	4 3500
124 Destroyer design	6	4 3750
125 Sport model	6	5 3700
126 Touring	6	6 3500
127 Touring	6	7 3500
131 Town car	6	6 4600
134 Knickerbocker Cab	6	7 5250
136 Sloping V Front Sedan	6	7 4600
136 Slop. Straight F. Sedan	6	7 4600
137 Philadelphia Berline	6	7 4900
138 Limousine	6	7 4650
141 Continental Landaulet	6	7 4900

The Madison Motors Co., Anderson, Ind.		
MADISON CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price	
7 Touring	6	7 \$1485

Matbohm Motors Co., Racine, Wis.		
MATBOHM CHASSIS, Pg. 36-39		
Model Body	Cyl. Pas. Price	
A All-Year Roadster	4	3 \$865
A Coupe	4	3 1095
B Sport Touring	6	4 975
B Touring	6	5 975
B Roadster	6	3 975
B Coupe	6	2 1375
B Sedan	6	5 1375

Maxwell Motor Co., Detroit, Mich.		
MAXWELL CHASSIS, Pg. 32		
Model Body	Cyl. Pas. Price	
25 Touring	4	5 \$745
25 Roadster	4	3 745
25 Coupe	4	3 1095
25 Sedan	4	5 1095
25 Town car	4	6 1095

Mercer Automobile Co., Trenton, N. J.		
MERCER CHASSIS, Pg. 32-33		
Model Body	Cyl. Pas. Price	
22-73 Touring	4	6 \$3500
22-73 Raceabout	4	6 3250
22-73 Sporting	4	6 3500
22-73 Runabout	4	6 3400

Mets Co., Waltham, Mass.		
METZ CHASSIS, Pg. 32		
Model Body	Cyl. Pas. Price	
25 Touring	4	5 \$695
25 Roadster	4	3 695
25 Open Delivery	4	3 550
25 T. and S. Curtain Del.	4	3 600
25 Panel Delivery	4	2 695

Mitchell Motors Co., Racine, Wis.		
MITCHELL CHASSIS, Pg. 32-37		
Model Body	Cyl. Pas. Price	
D-2-40 Roadster	6	2 \$1250
D-5-40 Touring	6	5 1250
D-4-40 Club Roadster	6	5 1280
D-40 Coupe	6	3 1850
D-40 Sedan	6	5 1950
D-5-40 Demountable	6	5 1550
C-2-42 Roadster	6	3 1490
C-4-42 Club Roadster	6	5 1560
C-5-42 Touring	6	5 1510
C-7-42 Touring	6	7 1525
C-42 Sedan	6	7 2275
C-42 Club Sedan	6	5 2185
C-42 Cabriolet	6	4 1960
C-42 Coupe	6	4 2135
C-42 Limousine	6	7 2850
C-42 Town car	6	7 2850
C-42 De Luxe Sedan	6	7 3425
C-42 Demountable	6	7 1825

Moline Automobile Co., East Moline, Ill.		
MOLINE-KNIGHT CHASSIS, Pg. 33		
Model Body	Cyl. Pas. Price	
C Roadster	4	4 \$1650
C Touring	4	5 1650
G Roadster	4	4 1985
G Touring	4	7 1985
G DeLuxe Touring	4	7 2250
L Sedan	4	5 2290

Monitor Motor Car Co., Columbus, O.		
MONITOR CHASSIS, Pg. 32		
Model Body	Cyl. Pas. Price	
C & R Touring	4	5 \$995
C & R Roadster	4	3-4 995
M Touring	6	5 1195
O Roadster	6	4 1195
O Roadster	6	3 1195

Monroe Motor Co., Pontiac, Mich.		
MONROE CHASSIS, Pg. 32		
Model Body	Cyl. Pas. Price	
M-3 Club	4	3 \$635
M-3 Sedan	4	4 965
M-6 Touring	4	5 1095

Moon Motor Car Co., St. Louis, Mo.		
MOON CHASSIS, Pg. 36-37		
Model Body	Cyl. Pas. Price	
36 Touring	6	5 \$1195
45 Touring-Roadster	6	7-4 1695
45 Cabriolet	6	3 2250
45 Cabriolet	6	7 2250
66 Touring	6	7 1850
66 Roadster	6	4 1850
66 Sedan	6	7 2450
66 Coupe	6	4 2350
66 Cabriolet	6	3 2350

Moore Motor Co., Minneapolis, Minn.		
MOORE-30 CHASSIS, Pg. 32		
Model Body	Cyl. Pas. Price	
E-30 Touring	4	5 \$695

Murray Motor Car Co., Pittsburgh, Pa.		
MURRAY CHASSIS, Pg. 40		
Model Body	Cyl. Pas. Price	
1918 Touring	8	7 \$2800
1918 Roadster	8	2 2800
1918 Touring	8	4 2800
1918 Limousine	8	7 4000
1918 Cabriolet	8	3 3600

Nash Motors Co., Kenosha, Wis.		
NASH CHASSIS, Pg. 37		
Model Body	Cyl. Pas. Price	
681 Touring	6	5 \$1295
683 Roadster	6	4 1295
684 Sedan	6	5 1985
671* Touring	6	7 1465

*Old Model.

National Motor Car and Vehicle Corp., Indianapolis, Ind.		
NATIONAL CHASSIS, Pg. 33-37-40		

Model Body	Cyl. Pas. Price	
Highway 6 Touring	6	7 \$1995
Highway 6 Sport Phaeton	6	4 1995
Highway 6 Roadster	6	4 1995
Highway 6 Touring Sedan	6	7 2820
Highway 12 Touring	12	7 2595
Highway 12 Sport Phaeton	12	4 2595
Highway 12 Roadster	12	4 2595
Highway 12 Touring Sedan	12	7 3420
Highway 12 Speedster	12	2 2650

Government's War Revenue Tax Extra Charge.

E. A. Nelson, Detroit, Mich.		
NELSON CHASSIS, Pg. 32		

Model Body	Cyl. Pas. Price	
1917-18 Semi-Speedster	4	2 \$1200
1917-18 Touring	4	4 1400
Nurdyke & Marmen Co., Indianapolis, Ind.		
MARMON CHASSIS, Pg. 36		
Model Body	Cyl. Pas. Price	
34 Touring	6	7 \$3550
34 Touring	6	5

Oakland Motor Car Co., Pontiac, Mich.		
OAKLAND CHASSIS, Pg. 37		
Model Body	Cyl. Pas. Price	
34-B Touring	6	5 \$990
34-B Roadster	6	3 990
34-B Coupe	6	4 1490
34-B Touring Sedan	6	5 1190
34-B Roadster Coupe	6	2 1150

Olds Motor Works, Lansing, Mich.		
OLDSMOBILE CHASSIS, Pg. 34-40		
Model Body	Cyl. Pas. Price	
45-A Touring	8	7 \$1467
45-A Sportster	8	5 1550
45 Club Roadster	8	4 1467
37 Touring	6	5 1185
37 Roadster	6	3 1185
37 Sedan	6	5 1695
37 Coupe	6	4 1595

Olympian Motor Co., Pontiac, Mich.		
OLYMPIAN CHASSIS, Pg. 32		
Model Body	Cyl. Pas. Price	
40 Touring	4	5 \$665
45 Touring	4	5 \$1085

40 Roadster	4	4 965
45 Roadster	4	4 1085
40 Sedan	4	5 1565
40 Coupe	4	3 1340

Packard Motor Car Co., Detroit, Mich.		
PACKARD CHASSIS, Pg. 40		

Model Body	Cyl. Pas. Price	
3-25 Standard Touring	12	7 \$3700
3-25 Salon Touring	12	7 2700
3-25 Phaeton	12	5 3700
3-25 Salon Phaeton	12	5 3700
3-25 Runabout	12	4 3700
3-25 Limousine	12	7 5250
3-25 Landaulet	12	7 5300
3-25 Coupe	12	4 5050
3-25 Brougham	12	6 5300
3-25 Brougham	12	7 5400
3-25 Imperial Limousine	12	7 5450
3-25 Chassis only	12	3300
3-35 Standard Touring	12	7 4100
3-35 Salon Touring	12	7 4100
3-35 Limousine	12	7 5650
3-35 Landaulet	12	7 5700
3-35 Brougham	12	7 5800
3-35 Imperial Limousine	12	7 5850
3-35 Chassis only	12	3600

Paige-Detroit Motor Car Co., Detroit, Mich.		
PAIGE CHASSIS, Pg. 37-38-41		

Model Body	Cyl. Pas. Price	
39 Linwood Touring	6	5 \$1330
39 Dartmoor Roadster	6	2-3 1330
39 Glendale Chum. Rd.	6	4 1330
39 Sedan	6	5 1925
55 Essex Touring	6	7 1775
55 Sedan	6	7 2850
55 Coupe	6	2-4 2850
55 Limousine	6	7 3230
55 Town car	6	7 3230

Pan-American Motors Co., Chicago, Ill.		
AMERICAN BEAUTY CHASSIS, Pg. 38		
Model Body	Cyl. Pas. Price	
G-6-5 Touring	6	5 \$1500
G-6-4 Close Coupled Tour.	6	4 1525
G-6-4 E Close Coup. T. Sed.	6	4 1850

Pan Motor Co., St. Cloud, Minn.		
PAN CHASSIS, Pg. 33		
Model Body	Cyl. Pas. Price	
250 Touring	4	5 \$950

Subject to Change.

W. A. Paterson Co., Flint, Mich.		
PATERSON CHASSIS, Pg. 38		
Model Body	Cyl. Pas. Price	
6-45 Touring	6	5 \$1265
6-45 Touring	6	7 1295
6-45 Roadster	6	4 1295
6-45 Sedan	6	5 1795

Peerless Motor Car Co., Cleveland, O.		
PEERLESS CHASSIS, Pg. 40		
Model Body	Cyl. Pas. Price	
56 Touring	8	7 \$2340
56 Roadster	8	4 2340
56 Sedan	8	7 2990
56 Coupe	8	4 2850
56 Limousine	8	7 3690
56 Sporting Roadster	8	2 2490

Pierce-Arrow Motor Car Corp., Buffalo, N. Y.		
PIERCE-ARROW CHASSIS, Pg. 38		

Model Body	Cyl. Pas. Price	
38-C-4 Runabout	6	2 \$4800
38-C-4 Runabout	6	3 4800
38-C-4 Coupe	6	2 5700
38-C-4 Coupe	6	3 5700
38-C-4 Touring	6	4 4800
38-C-4 Touring	6	5 4800
38-C-4 Brougham	6	5 5900
38-C-4 Landaulet	6	5 5900
38-C-4 Sedan	6	5 5900
38-C-4 Vestibule Brougham	6	6 6100
38-C-4 Brougham-Landaulet	6	5 5900
38-C-4 Vestibule Landaulet	6	6 6100
38-C-4 Vest. Brough-Land.	6	6 6100
38-C-4 French Brougham	6	5 5900
38-C-4 French Brough-Land	6	5 5900
38-C-4 Town Brougham	6	5 5900
38-C-4 Town Brough-Land	6	5 5900
38-C-4 Roadster	6	4 4800
38-C-4 Convertible Roadster	6	5 5700
48-B-4 Runabout	6	2 5400
48-B-4 Runabout	6	3 5400
48-B-4 Coupe	6	2 6400
48-B-4 Coupe	6	3 6400
48-B-4 Touring	6	4 5400
48-B-4 Touring	6	5 5400
48-B-4 Touring	6	7 5500
48-B-4 Brougham	6	6 6600

48-B-4	Suburban	6	6800
48-B-4	Landau	6	6800
48-B-4	Suburban Landau	6	6800
48-B-4	Vestibule Suburban	6	7000
48-B-4	Vestibule Landau	6	7000
48-B-4	Vestibule Brougham	6	7000
48-B-4	Vest. Suburban Land	6	7000
49-B-4	Roadster	4	5400
48-B-4	Convertible Roadster	6	6400
66-A-4	Runabout	6	4 6400
66-A-4	Runabout	6	3 6400
66-A-4	Coupe	6	2 7400
66-A-4	Coupe	6	3 7400
66-A-4	Touring	6	4 6400
66-A-4	Touring	6	5 6400
66-A-4	Touring	6	7 6500
66-A-4	Brougham	6	7600
66-A-4	Suburban	6	7800
66-A-4	Suburban Landau	6	7800
66-A-4	Vestibule Suburban	6	8000
66-A-4	Vestibule Landau	6	8000
66-A-4	Vestibule Brougham	6	7800
66-A-4	Vest. Suburban-Land	6	8000
66-A-4	Roadster	6	4 6400
66-A-4	Convertible Roadster	6	7400

Pilgrim Motor Car Co., Detroit, Mich.			
PILGRIM CHASSIS, Pg. 23			
Model	Body	Cyl. Pas. Price	
37	Touring	4 5	\$895
37	Roadster	4 4	895

Pilot Motor Car Co., Richmond, Ind.			
PILOT CHASSIS, Pg. 38			
Model	Body	Cyl. Pas. Price	
6-45	Touring	6 5	\$1295
6-45	Roadster	6 4	1295
6-45	Demountable Sedan	6 5	1520
6-45	Demountable Coupe	6 4	1520

F. R. Porter Co., Port Jefferson, N. Y.			
F. R. P. CHASSIS, Pg. 31			
Model	Body	Cyl. Pas. Price	
45-A	Touring Chassis	4 7	\$7000
45-B	Tour. Chassis	4 7	7000

Premier Motor Corp., Indianapolis, Ind.			
PREMIER CHASSIS, Pg. 38			
Model	Body	Cyl. Pas. Price	
6-C	Touring	6 7	\$2285
6-C	Roadster	6 4	2285
6-C	Tour. Lim. Sedan	6 7	2285

Princess Motor Car Corp., Detroit, Mich.			
PRINCESS CHASSIS, Pg. 33			
Model	Body	Cyl. Pas. Price	
4-36	Touring	4 5	\$825
4-36	Roadster	4 3	825
4-36	Speedster	4 2	825

Regal Motor Car Co., Detroit, Mich.			
REGAL CHASSIS, Pg. 33-39			
Model	Body	Cyl. Pas. Price	
J	Touring	4 5	\$795

Reo Motor Car Co., Lansing, Mich.			
REO CHASSIS, Pg. 33-38			
Model	Body	Cyl. Pas. Price	
R	Touring	4 5	\$985
R	Roadster	4 2	985
M	Touring	6 7	1385
N	Roadster	6 4	1385

Saginaw Motor Car Co., Saginaw, Mich.			
YALE BIGHT CHASSIS, Pg. 40			
Model	Body	Cyl. Pas. Price	
M	Touring	8 7	\$1950
M-R	Roadster	8 4	1950
M-S	Speedster	8 4	1950

Saxon Motor Car Co., Detroit, Mich.			
SAXON CHASSIS, Pg. 33-38			
Model	Body	Cyl. Pas. Price	
B-5-R	Roadster	4 2	\$445
S-4-T	Touring	6 5	935
S-4-R	Roadster, chummy	6 3	935
S-4-S	Sedan	6 5	1395

Savers & Scovill Co., Cincinnati, O.			
SAYERS CHASSIS, Pg. 38			
Model	Body	Cyl. Pas. Price	
Light Six	Touring	6 5	\$1295
Scrapps-Booth Corp., Detroit, Mich.			
SCRIPPS-BOOTH CHASSIS, Pg. 38			
Model	Body	Cyl. Pas. Price	
Six 39	Touring	6 5	\$1250
Six 40	Roadster	6 3	1425
H	Four Passenger	8 4	1585

Seneca Motor Car Co., Fostoria, O.			
SENECA CHASSIS, Pg. 33			
Model	Body	Cyl. Pas. Price	
D	Five Passenger Open	4 5	\$850
E	Four-Passenger Road	4 4	900
F	Light Delivery	4 4	825

Singer Motor Co., Inc., New York City.			
SINGER CHASSIS, Pg. 38			
Model	Body	Cyl. Pas. Price	
18	Touring	6 7	\$3800

Shadbourne Combined Motors Co., Chicago, Ill.

BOUR-DAVIS CHASSIS, Pg. 24			
Model	Body	Cyl. Pas. Price	
18-B	Touring	8 5	\$1650

Standard Steel Car Co., Pittsburgh, Pa.			
STANDARD CHASSIS, Pg. 4			
Model	Body	Cyl. Pas. Price	
G	Touring	8 7	\$2450
G	Roadster	8 4	2450
G	Roadster	8 2	2450
G	Sedan	8 7	3500
G	Limousine	8 7	4000
G	Coupe	8 3	3500

The F. M. Stearns Co., Cleveland, O.			
STEARNS-KNIGHT CHASSIS, Pg. 33-40			
Model	Body	Cyl. Pas. Price	
S. K. L. 4	Touring	4 5	\$1785
S. K. L. 4	Roadster	4 4	1785
S. K. L. 4	Coupe	4 4	2400
S. K. L. 4	Limousine	4 7	3350
S. K. L. 4	Limousine Bghm.	4 7	3400
S. K. L. 4	Landaulet	4 7	3300
S. K. L. 4	Landaulet Bghm.	4 7	3350
S. K. L. 4	Springfield C. Sed.	4 7	2335
S. K. L. 4	Chassis	4	1625
S. K. L. 4	Touring	4 7	2165
S. K. 8	Touring	8 7	2575
S. K. 8	Roadster	8 4	2575
S. K. 8	Coupe	8 4	3200
S. K. 8	Coupe Landaulet	8 4	3200
S. K. 8	Limousine	8 7	3375
S. K. 8	Limousine Bghm.	8 7	3375
S. K. 8	Landaulet	8 7	3985
S. K. 8	Landaulet Bghm.	8 7	3985
S. K. 8	Chassis	8	2050

The F. M. Stearns Co., Cleveland, O.			
STEARNS-KNIGHT CHASSIS, Pg. 33-40			
Model	Body	Cyl. Pas. Price	
S. K. L. 4	Touring	4 5	\$1785
S. K. L. 4	Roadster	4 4	1785
S. K. L. 4	Coupe	4 4	2400
S. K. L. 4	Limousine	4 7	3350
S. K. L. 4	Limousine Bghm.	4 7	3400
S. K. L. 4	Landaulet	4 7	3300
S. K. L. 4	Landaulet Bghm.	4 7	3350
S. K. L. 4	Springfield C. Sed.	4 7	2335
S. K. L. 4	Chassis	4	1625
S. K. L. 4	Touring	4 7	2165
S. K. 8	Touring	8 7	2575
S. K. 8	Roadster	8 4	2575
S. K. 8	Coupe	8 4	3200
S. K. 8	Coupe Landaulet	8 4	3200
S. K. 8	Limousine	8 7	3375
S. K. 8	Limousine Bghm.	8 7	3375
S. K. 8	Landaulet	8 7	3985
S. K. 8	Landaulet Bghm.	8 7	3985
S. K. 8	Chassis	8	2050

Stephens Motor Branch Moline Plow, Moline, Ill.			
STEPHENS-SIX CHASSIS, Pg. 38			
Model	Body	Cyl. Pas. Price	
70	Roadster	6 3	\$1485
74	Roadster	6 4	1550
75	Roadster	6 5	1485
78	Sedan	6 5	1985

The Studebaker Corporation of America, South Bend, Ind.			
STUDEBAKER CHASSIS, Pg. 33-39-41			
Model	Body	Cyl. Pas. Price	
S. H.	Touring	4 5	....
S. H.	Roadster	4 2	....
S. H.	Sedan	4 5	....
E. H.	Touring	6 5	....
E. H.	Roadster	6 2	....
E. H.	Roadster	6 4	....
E. H.	Sedan	6 5	....
E. G.	Touring	6 7	....
E. G.	Sedan	6 7	....

Stutz Motor Car Co., Indianapolis, Ind.			
STUTZ CHASSIS, Pg. 33-35			
Model	Body	Cyl. Pas. Price	
S-400	Speedster	4 2	\$2550
S-400	Roadster	4 2	2550
S-400	Close Coupe	4 4	2650
S-400	Touring	4 6-7	2750

The Templar Motors Corp., Cleveland, O.			
TEMPLAR CHASSIS, Pg. 32			
Model	Body	Cyl. Pas. Price	
445	Roadster	4 2	\$2255
445	Victoria	4 4	2155
445	Touring	4 4	1985
445	Salon Touring	4 5	1985

Traverse City Motor Car Co., Traverse City, Mich.			
NAPOLEON CHASSIS, Pg. 32-37			
Model	Body	Cyl. Pas. Price	
18-35	Chummy	4 4	\$1085
18-36	Streamline Pleasure	4 5	1085
18-38	Closed Delivery	4	1040
18-39	Pleasure	6 5	1285

Trumbull Motor Car Co., Philadelphia, Pa.			
TRUMBULL CHASSIS, Pg. 33			
Model	Body	Cyl. Pas. Price	
16 B	Roadster	4 2	\$495
16 B	Coupe	4 2	750

Velle Motors Corp., Moline, Ill.			
VELIE-BILTWEEL CHASSIS, Pg. 39			
Model	Body	Cyl. Pas. Price	
38	Touring	6 5	\$1340
38	Roadster	6 4	1340
38	Roadster	6 2	1340
38	Coupe	6 4	1900
38	Cabriolet	6 2	1800
38	Sedan	6 5	1885
38	Town car	6 5	2450
39	Touring	6 7	1595
39	Sport model	6 4	1850

Watson & Stoeckel, New York.			
KNIGHT SPECIAL CHASSIS, Pg. 31			
Model	Body	Cyl. Pas. Price	
B	Chassis	4	\$5000

The Westcott Motor Car Co., Springfield, O.			
WESTCOTT CHASSIS, Pg. 39			
Model	Body	Cyl. Pas. Price	
18	Touring	6 7-5	\$1940
18	Roadster	6 4	1890
18	Sedan, convertible	6 7-5	2790
18	Coupe, convertible	6 4	2790
18	Sportster	6 5	2290

The White Co., Cleveland, O.			
WHITE CHASSIS, Pg. 33			
Model	Body	Cyl. Pas. Price	
G. M.	Chassis	4	\$3900
G. M.	Touring	4 7	5000
G. M.	Limousine	4 7	6200
G. M.	Landaulet	4 7	6200
G. M.	Cabriolet	4 7	6400
G. M. T.	Chassis	4	3850
G. M. T.	Runabout	4 4	5000
G. M. T.	Town car	4 6	6050
G. M. T.	Town car Landaulet	4 6	6050
G. M. T.	Sedan	4 4	6050
G. M. T.	Coupe	4 3	6050

Willys-Overland Co., Toledo, O.			
OVERLAND CHASSIS, Pg. 32-37			
Model	Body	Cyl. Pas. Price	
Country Club	Roadster	4 4	\$840
90	Touring Car	4	795
90	Roadster	4	780
90	Sedan	4	1240
85-4	Touring	4 5	930
85-4	Roadster	4 2	915
85-6	Touring	6 5	1130
85-6	Tour. Sedan	6 5	1620
85-6	Tour. Coupe	6 3	1420

Willys-Knight CHASSIS, Pg. 33-40			
88-4	Touring	4 7	1525
88-4	Coupe	4 4	2175
88-8	.....	8	2000
88-8	Tour. Sedan	8	2700
88-8	Limousine	8	2800
88-8	Town car	8	2800

Willys-Six CHASSIS, Pg. 37			
89-6	Touring	6 7	1525
89-6	Sedan	6 6	2045

Winton Co., Cleveland, O.			
WINTON CHASSIS, Pg. 39			
Model	Body	Cyl. Pas. Price	
33	Touring	6 7	\$3000
33	Touring	6 5	2900</

M
Milburn Wagon Co., Toledo, O.
MILBURN CHASSIS, Pg. 41
 Model Body Pas. Price
 27 Electric Brougham.....4 \$1885

O
The Ohio Electric Co., Toledo, O.
OHIO CHASSIS, Pg. 41
 Model Body Pas. Price
 44 Coupe5 *\$2680
 63 Coupe5 3250

*War tax extra.

STEAM CARS

Doble-Detroit Steam Motors Co., Detroit, Mich.

DOBLE-DETROIT CHASSIS, Pg. 41
 Model Body Pas. Price
 D Touring7 \$3750

Stanley Motor Carriage Co., Newton, Mass.

STANLEY CHASSIS, Pg. 41
 Model Body Cyl. Pas. Price
 735 Touring2 7 \$2600
 736 Touring2 5 2550



Mrs. Dickover, Automobile Dealer.

E. A. CASSIDY CO. WILL MARKET RAJAH PLUGS.

The Edward A. Cassidy Co. of New York has taken over the sales department of the Rajah Auto Supply Co. of Bloomfield, N. J., makers of Rajah Spark Plugs and Rajah Spark Plug Terminals, and will have entire charge of the Rajah business hereafter.

The Rajah plug, which is one of the best known brands in the world, has been manufactured for the past 16 years. Many racing cars use Rajah plugs and they are also used by airplane makers and the government Army and Navy planes. The quality of the Rajah plug, together with the extensive prestige in the industry enjoyed by the Cassidy company, makes a strong sales combination, and a progressive sales campaign is being inaugurated which will be backed up by a nation wide advertising campaign.

Makes Her Mark In The Automobile Industry

Vassar Girl Enters the Field Enthusiastically with an Agency at Pleasantville, N. Y.

WONDERFUL business fields lie open before bright, capable women, and one of the best of them is the automobile business. Timely emphasis of this fact is found in Pleasantville, N. Y., a suburban town of 3000 inhabitants, where Mrs. Dickover, a graduate of Vassar, who was subsequently trained for a period in a prominent New York business house, is making her mark as a successful automobile dealer.

Mrs. Dickover, who was Miss Koster at Vassar, started on her business career with four college friends in the typical American fashion, determined to earn their living, and what was more, living on what she earned. Mrs. Dickover graduated from college in 1915. Her enthusiasm to earn her living was bounded by her scholastic attainments, which were mainly in the line of English, particularly writing, economics, political science and social psychology. At her home in Pleasantville the round of club work, church, Red Cross and social duties in which she engaged first after the close of school days was not sufficiently satisfying. So, with her friends, she rented an apartment in Greenwich village and secured a position with a New York publicity house. There she learned to meet people in a business way and gradually office management fell to her.

Ultimately she left the publishing house, a bride, and with her husband, a Brooklyn man, embarked in the realities of business when they secured an agency for the Buick car and at once bought an established service station and supply store in Pleasantville.

Mrs. Dickover spends most of her time in the show room of the Dickover Buick Agency, but also picks up many prospects and handles them herself, making the demonstrations and closing the sales. Her college training, supplemented by her office experience, now serves her in good stead, enabling her to understand the customers' aims and desires, and influencing them to a decision.

She says: "I find that being a woman I can understand what a woman looks for in a car and through my experience in explaining machinery in a non-technical way I can make women feel confident of their ability to handle a car and even understand a good deal about it. In buying a passenger car the woman's choice rules nine times out of 10."

Mrs. Dickover this season aggressively promoted winter business. When their

business had gone so successfully for a period she superintended the preparation of follow-up letters and mailing a winter's season of systematizing lists. On this intensive office work and a campaign of advertising as a solid business foundation, a big season in the spring and summer of 1918 is anticipated.

MOTOR SPECIALTIES CO.
WILL EXHIBIT AT THE ASTOR.

The Motor Specialties Co., Waltham, Mass., will have a special display at the Hotel Astor during the week of the National Automobile Show in New York. Being unable to secure the required amount of space to properly exhibit its products at the Grand Central Palace, the company decided to have a comprehensive display, so the quarters were secured in the Astor, where the New York Salon is held annually.

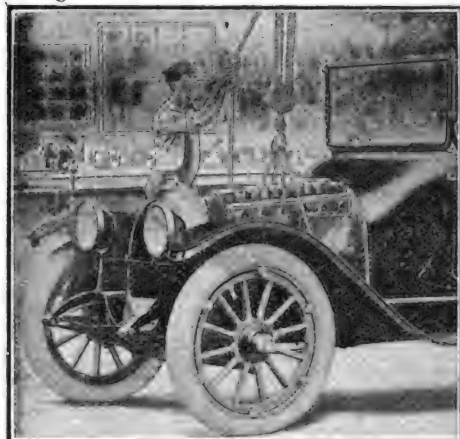
General Manager F. C. Hershee and Sales Manager A. Fraser will have charge of the exhibit and all the company's salesmen will be present during the week to meet the trade and assure them of the proper attention and cordiality. A number of new specialties are being introduced on the market by the company, which are being backed up by an extensive advertising campaign. The Mosco line for 1918 includes: Bemus Timer, Marine Type No. 1300 with circuit breaker, "Mosco" Steering Rod Anti-Rattler, Improved Bemus Timer, "Mosco" Floating Plunger Wheel Puller, "Mosco" Valve Spring Grinder, "Mosco" Socket Nut and Bolt Holder, "Mosco" Demountable Rim Tool and "Mosco" Valve Spring Compressor.

MANLEY MACHINES AS PRIZES.

A notable prize contest is scheduled for the national automobile shows, at New York and Chicago, by the United Engine and Manufacturing Co., Hanover, Pa. The prizes are one Manley Portable Crane, one Manley Engine Stand, one Manley Two-ton Press and one Manley Two-tank Oil Service. The four prizes will be given to the four contestants who submit the best reasons why they want the respective machines for which they compete. Papers will be kept by duplicate numbers and the winners will be decided by a board of judges to insure that the garage man who gives the best reason why he should be awarded the machine will be the one who will get it, whether the winning reason be in one word, a sentence or a combination of reasons. The New York show contest will close on Jan. 26, 1918.

U. S. RUBBER HAS LARGEST SERVICE FLAG IN NEW ENGLAND.

The United States Rubber Co. has unfurled the largest service flag in New England from its branch store at 130 Essex street, Boston. The flag has 1544 stars, which represent mostly men who enlisted from the New England cities, where the company's plants and branches are located.



Overhauling *The* Automobile

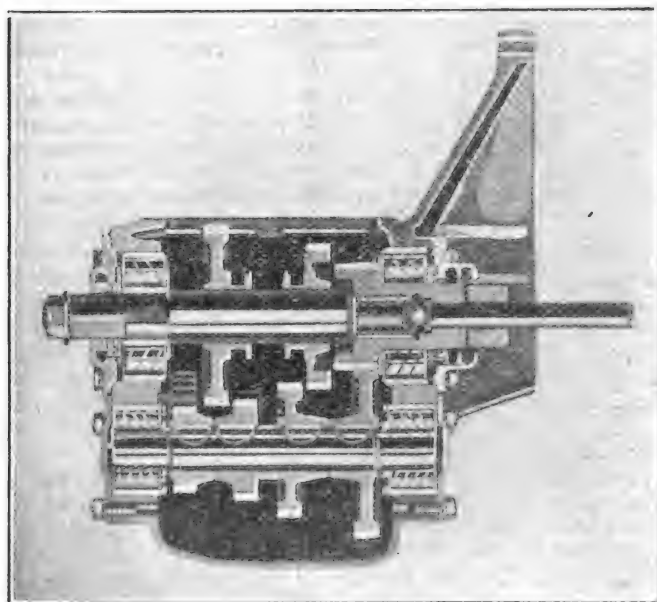
HUDSON SUPER SIX ¹

This is the 12th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 13th article of this series will appear in the Jan. 10th issue of the Automobile Journal.

SINCE its initial appearance the mechanical construction of the Hudson Super-Six has been changed but little. In many cases, particularly in the transmission and rear axle, it is similar to the six of previous models.

The engine is of the L head type and is fitted with removable head. Circulation in the radiating system is maintained by a centrifugal water pump, while that of the oiling system is kept up by the action of a plunger pump. Both the gearset and clutch are in unit with the engine, the latter being mounted in the flywheel and removable only when the transmission has been taken from the engine. Practically all of the engine overhaul work may be done on that unit without removing it from the frame, the only exception being the replacement of the upper halves of the main bearings and repairs to the crankshaft.

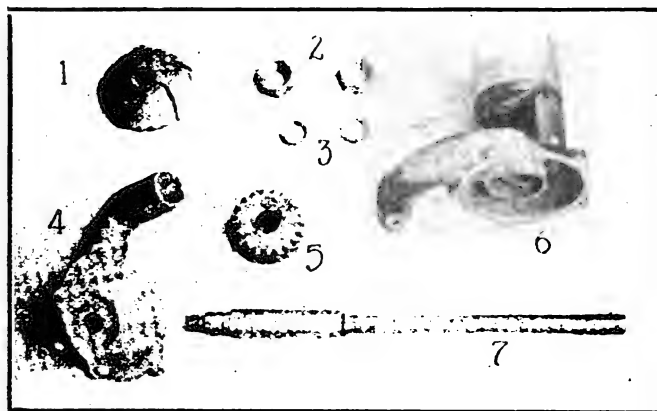
The rear axle is of the semi-floating type and the differential may be removed either integral with the front part, upon which is mounted the propeller shaft and drive pinion, or through the hand hole plate in the rear, after the wheel shafts have been taken out.



Sectional View of Transmission Gearset.

Beginning of Overhaul Work.

If the overhaul is to be general the radiator should first be drained and then removed from the chassis. This unit is bolted to the chassis by a bolt on each side, retained by a brace rod at the top and connected with the engine through two flexible hose connections.



Water Pump Components: 1, Impellor; 2, Stuffing Box Nuts; 3, Packing Washers; 4, Pump Cover; 5, Pump Timer Gear; 6, Pump Body; 7, Pump Shaft.

With the radiator free from the car the water manifold should be removed. The two storage battery wires should next be disconnected from the battery and after the primary wire leading to the distributor unit has been unfastened and the distributor head removed, as well as the spark plug wires disconnected, the clips fastening the ignition cable tube to the engine should be disconnected. The ignition wiring can then be lifted from the engine and tied back against the dash.

The hot air pipe leading from the hot air stove on the exhaust manifold to the carburetor should next be unclamped from the carburetor and removed, leaving the top of the engine clear for further work.

When the cap screws fastening the cylinder head to the block have been taken out the head may be lifted from the engine, exposing the pistons, cylinders, valves and firing chambers. Carbon, after having been softened by the use of kerosene oil, may be removed very easily with a dull chisel or screw driver. A stiff wire brush makes an ideal tool for scraping the carbon from the valve chambers.

Carbon Removal and Valve Grinding.

In removing carbon, care must be observed not to scrape the polished sides of the cylinders or the faces of the valves. For this reason the piston in the cylinder upon which the work is being done should be brought to the top of the explosion stroke. In this position both the valves will be closed, preventing the escape of carbon into the exhaust and intake manifold passages.

Not until the carbon has been removed from the pistons and explosion chambers should the valves be taken out for grinding. When this has been done the valve springs may be lifted and the split washers removed, releasing the springs

and spring washers. To avoid confusion and prevent misplacement but one valve should be removed or worked on at a time. If all 12 are taken out they should be marked, since they are not interchangeable. Before starting the grinding operation a careful examination should be made of the valve stem and guide. The stem should fit the guide accurately, for if there should be gas leakage at this point the engine efficiency is greatly impaired.

Inspection will show whether a new guide, or new valve, or both are necessary. The guides or bushings are inserted from the outside and may be driven out from the top with a soft iron, or brass rod and hammer.

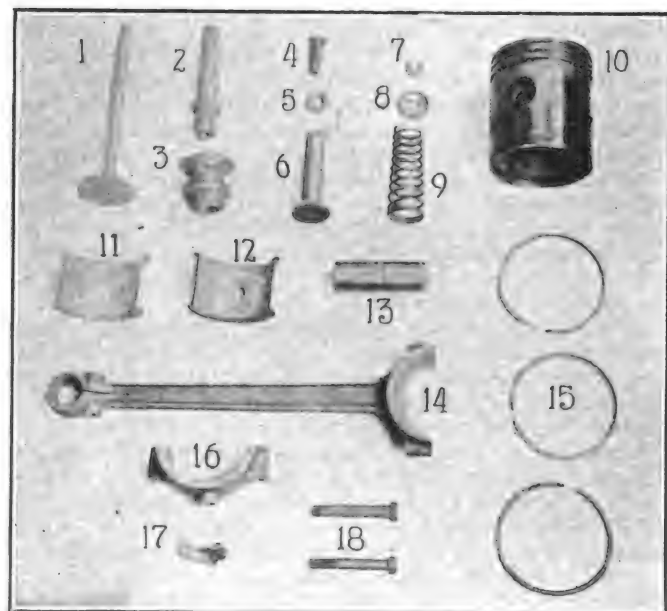
Another important point to be considered before grinding a valve is the amount of grinding that has already been done on the valve in question. After repeated grindings the cutting away of the metal allows the valve to sink down into the seat to such an extent that the opening around the valve when opened by the push rod action is much less than normal. Where such a condition is found the valve should be replaced by a larger one and the valve reseated.

If the valve has been warped out of round or the surface appears uneven, it may be recut before being ground into place. As a general rule, the upper corner of the bevel should be flush with the surface of the valve chamber, permitting maximum opening when in operation.

The valves may be ground with a screw driver or valve tool, a piece of cloth having been stuffed into the valve chamber to prevent the grinding compound from working into the valve stem guide. All possible precaution should be taken to prevent the grinding compound from getting into any of the moving parts of the engine.

But little grinding compound should be used on each valve, the compound being smeared over the seat and the valve turned about 90 degrees back and forth, rather than rotated. After each six or seven movements the valve should be turned through 190 degrees and the action continued until every part of the valve surface has been ground against every part of the seat. Rotary motion tends to cut rings around the seat, reducing the efficiency of the engine and increasing the chance for carbon pitting, etc.

As each valve is ground the port should be thoroughly cleaned and the valve, spring, washer and retainer replaced. The springs should be stiff enough to require the use of a valve spring lifter for replacing. If they can be compressed by the hands alone and put into place, without the lifter, they



Piston and Valve Parts: 1, Valve; 2, Valve Stem Bushing; 3, Push Rod Bushing; 4, Adjusting Stud; 5, Lock Nut; 6, Push Rod; 7, Valve Retaining Washer; 8, Valve Spring Washer; 9, Valve Spring; 10, Piston; 11, 12, Connecting Rod Bearings; 13, Wrist Pin; 14, Connecting Rod; 15, Piston Rings; 16, Connecting Rod Cap; 17, Dipper; 18, Retaining Bolts.



Universal Joint and Differential Parts: 1, Universal Joint Flange; 2, Assembled Joint; 3, Master Gear; 4, Universal Cross or Spider; 5, Universal Sleeve Yoke; 6, Bushings; 7, Pinion Gear; 8, Flange Yoke.

should be replaced with new, or the valve action will be sluggish.

The water jackets in the head, as well as the passages in the cylinder block, should be cleaned thoroughly. This can be accomplished by the use of a stiff wire and a strong solution of potash lye or washing soda. Efficient radiation prolongs the life of the engine and tends to prevent the burning out of bearings, the scoring of cylinders and the warping of valves from overheating.

The pressed steel oil reservoir, which is bolted to the lower part of the crank case, should next be removed, after draining the oil from the system. When the base has been taken from the engine the lower part of the engine is exposed.

Examining Bearings for Wear.

All of the bearing caps, both for the main bearings and the connecting rods, are fastened in place by two steel bolts on each bearing. When the caps have been removed from the connecting rod bearings the pistons may be removed through the top of the engine. Like the valves the pistons and connecting rods should be replaced in their respective places and should be marked with the number of the cylinder before removal.

In replacing connecting rods be sure that the dipper opening on the cap faces toward the left side of the engine. For the purpose of compensating for wear there are a number of thin strips of metal, called shims, between the connecting rod caps and the body of the rod. If the connecting rod is a good fit on the shaft these shims should be replaced in their proper places, or the bearings will not line up properly. Shims may be obtained in varying thicknesses and the bearing adjustment may be fitted by the insertion of proper thickness shims.

As a general rule most of the wear on main bearings is found to be in the caps. For this reason the upper parts seldom need replacement. If it is found that the upper part of the main bearings is badly worn the engine must be removed from the frame; otherwise, this will be unnecessary.

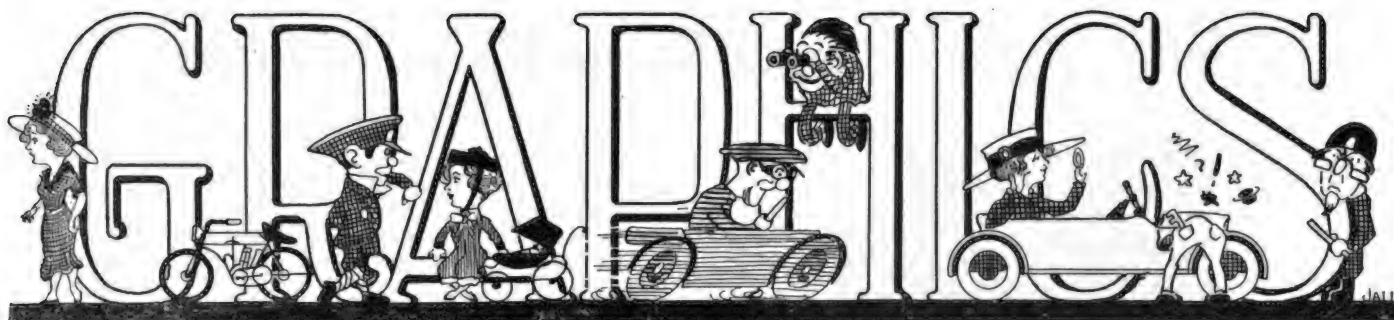
Examination of the Cylinders.

While the pistons are out of the engine each cylinder should be given a careful examination for scores or scratches through which the gas or explosions may pass. Small scratches or scores may often be filled by an application of graphite through the carburetor intake while the engine is running, while deep scores should be welded, plated or ground out. For the repairs of this nature the cylinder block should be removed from the engine. Unless this is necessary the block should be left in place.

Reboring or regrinding is also necessary where the cylinders have been worn out of round. A series of measurements should be made to determine this fault.

No part of the engine is of more importance than the oiling system. As has been said before, oil is supplied by a plunger pump and is termed combination force feed and

(Continued on Page 61.)



Motorists of West Chester, Pa., have changed the name of the big club from Delaware County Automobile Club to Keystone Automobile Club. Eighty-three new members were admitted re-



cently, making the total membership 3491, the largest of any like motor club in the East. A new emblem showing a keystone has been adopted.

From all indications 1918 will be one of the best years for demand for car services that the industry has ever seen. A hint of this to the owner should be sufficient.

The American Liberty motor has been developed to such a point that the Allies are considering the purchase of a number of them for installation in their machines, according to statements by members of the Aircraft Production Board. Some hardy seers believe that the program of "through the air and at 'em boys" is one of the strongest incentives for peace circulating in the minds of the war-worn people beyond the Rhine.

The first fleet of motor trucks to carry government munitions from an inland point to the coast has been happily called the "Liberty truck train." Encountering bad weather and heavy snowdrifts, six days of actual traveling were necessary to traverse the 300 miles between Detroit and Pittsburgh.

Myrtle Stedman, a film star, who posed recently in a big Detroit factory for a big film spectacle founded on the motor car industry, made an address to some

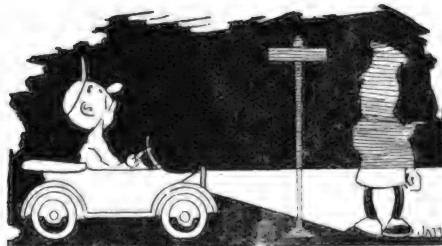


of the employees. The following are a few of her timely comparisons of the moving picture and automobile industries: "The reason the automobile and

the moving picture industry are so typically American and immensely popular is because they are essentially constructive industries. Both are building useful, practical products. The world needs both and the films need the automobiles. I have always insisted that the word pleasure car is a misnomer without a cause. A trolley ride is oftentimes a pleasure, but who would call a trolley car a pleasure car."

Every available inch of floor space has been taken for the National Automobile Show of Eastern Canada, at Montreal. The car exhibitors will number 45 and accessory exhibitors 18, making a grand total of 95 makes of cars and 245 exhibits of accessories.

Hub police authorities have issued warnings to violators of the automobile headlight law and strict action is taken on persons having headlights which are both dangerous and dazzling. An automobile in motion equipped with head-



lights which have no dimmers is especially under the ban in Boston.

The Wisconsin State Highway Commission in 1918 intends to establish a department to inaugurate a system of road maintenance and supervision similar to that in effect in European countries for many years. The patrol system contemplated is estimated to cost about \$750,000 during the first year.

Authorities of Texas towns who recently conducted an investigation into alleged deterioration of gasoline in the hands of dealers resulted in the finding of comparatively little practise of this kind. Defective pumps, or pumps with vents closing prematurely and thereby retaining about a pint of gasoline, were found in such numbers that warnings of prosecution have been given unless all vents in the pumps are kept open.

Owing to the war the rates on crude rubber shipments from the ports of Singapore and Penang to the Pacific coast have risen from \$24 to \$95 a ton.

Too much watering of the tea in a Chinese restaurant pantry made as much trouble recently as they say watering motor stocks in Wall street will do. It was the ill luck of a large motor com-



pany in Bangor, Me., to be occupying the ground floor underneath the place where Celestial cooks had been happily mixing golden oolong with chop, not long before, when a water pipe burst. All the catalogues, files and books of the motor company were spoiled and the varnish all washed from the furniture and walls.

Two aeroplane motors which have won fame in battles abroad are on the program as features of the 14th annual automobile salon, which opens in the grand ball room of the Hotel Astor the day after New Year's. One is a replica of the Rolls-Royce motor in the Handley-Page aeroplane, which made a world's record by flying with a crew of three men from London to Salonica, a distance in the air line of 1500 miles.

Among numerous "Tips to Auto Drivers" the temperance lesson appeals strongly to all users of motor cars. This and a few more timely cautions are here appended:

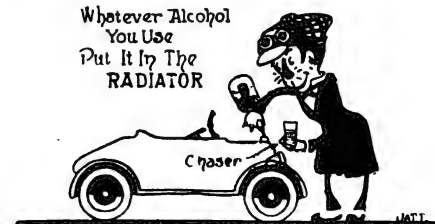
Look out for boys stealing rides on teams.

Don't try to talk to persons in the tonneau when driving.

Whatever alcohol you use put it in the radiator.

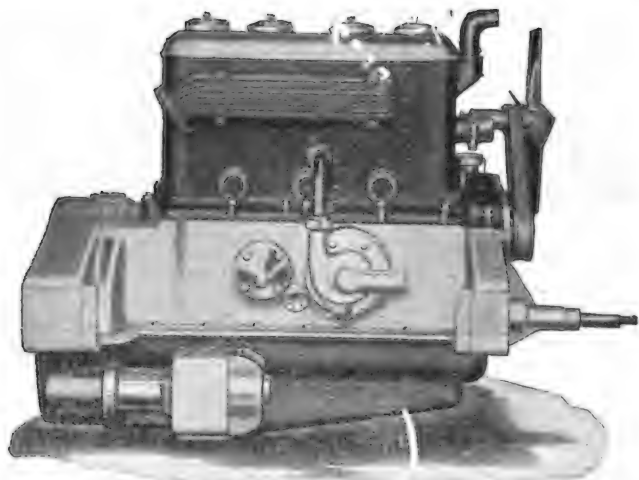
Don't drive fast with a soft tire or one that is nearly worn out.

Whatever Alcohol
You Use
Put It In The
RADIATOR



When in doubt, go slow and stop. Watch for the pedestrian who tries to cross the street after you have received the traffic officer's signal to go ahead.

The American Sleeve-Valve Motor



Right Side of the American Sleeve-Valve Motor, Showing the Water Pump Seated in the Side of the Crank Case.

REMARKABLE power at low speed, rapid ratio of power increase at higher speeds, exceptional rapidity of acceleration and a degree of flexibility unknown with other types of engines, are among the broad claims for superiority of the design of the engine built by the American Sleeve-Valve Motor Co., Philadelphia and New York, which will be shown for the first time at the New York automobile show at spaces D-88 and D-89 at the Grand Central Palace, and at the Chicago show at spaces 11-12, gallery, First Regiment Armory.

With reference to the design emphasis should be made that the engine does not differ in general appearance from either the poppet valve or sliding sleeve valve engines of conventional practise, and statement is made that the same principles that will be seen in the exhibit—a four-cylinder, four-cycle, vertical, water cooled type, can be applied to six, eight or 12-cylinder engines.

The engine differs from other sleeve valve constructions in that the sleeves are single units that extend the entire length and revolve within the cylinders, and within these the pistons have the usual reciprocating movement. In the Knight type engines the sleeves are divided longitudinally and have reciprocal motion, being actuated by eccentric shafts, the valves being ports in the sleeve which register with ports that admit the fuel gas and emit the exhaust.

The sleeves constantly revolve and are in no sense comparable with rotating valve constructions. In the upper ends of the sleeves are two rectangular ports, the centres of which are 180 degrees apart on the circumference that register with the ports of the intake and exhaust manifolds. The claim is made that the revolving cylindrical sleeve between the piston and the cylinder walls is the dominant feature of the design—that this construction affords highly important advantages. These are, first, perfect valve control and perfect timing at all speeds, with the utmost simplicity; second, that this insures uniform compression in all cylinders by equalizing the wear resultant from piston thrust.

Statement is made that the sleeve action cannot be varied because of carbon or unconsumed residuum in the cylinder, as obtains at times with poppet valve engines, and there is no possibility of the timing of the sleeves being

changed through wear. There is a film of oil between the cylinder wall and the sleeve, and ample lubrication at all times. Because of the unvarying precision of the sleeve action the engine is claimed to be one of the fastest ever built. The engineers of the company state that it has all the advantages of the original type of sleeve valve engines in greatly simplified form, because there are nearly 100 less parts than in the average four-cylinder poppet valve engine, there being no valves, valve guides, valve springs, collars, keys, valve tappets, tappet guides, tappet adjusting screws and nuts and no cam shaft. There are no adjustments such as are necessary for these parts.

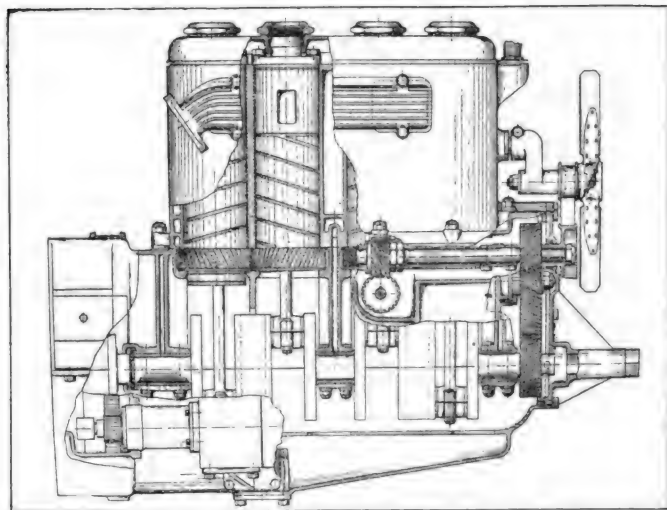
Referring to the illustration one notes that the cylinder block is cast with the water jacket integral and that the exhaust ports are at the right side and the intake ports at the left side. The end section drawing shows the detail of construction clearly, that the cylinders are open and each is fitted with a separate head that is fully water jacketed, in which is a conical combustion chamber, the head seating into the sleeve to approximately the height of the piston at top centre. This head is retained by four studs and all four heads are enclosed by a cover that is secured by collars fitted to the tops of the heads, surrounding recesses into which the spark plugs are seated. The water circulates under this cover, completely surrounding the combustion chambers and the greater part of the length of the spark plug pockets.

The crank case is in two sections, the upper half having a centre vertical transverse web that carries the main bearing, and both have forward extensions that house the timing gearset and rear extensions that form the bell housing for the flywheel. A horizontal web in the lower section forms the base of the crank chamber and the top of the oil reservoir, which extends practically the length of the case. The upper crank case section is recessed under the bases of the cylinder seats, and in these recesses are placed hardened steel washers on which the sleeves rest and revolve. There are pockets in which the spiral gears that drive the sleeves are housed, and the water pump is also seated into the side of the casting, so that by installing a cover the pump assembly is completely enclosed. This pump is driven by a spiral gear that meshes with a similar gear on one end of a short shaft that has a spiral gear that is driven by the shaft that drives the cylinder sleeves.

The pistons are conventional in design, being fitted with



Parts of an American Sleeve-Valve Motor Disassembled, Showing the Small Number of Components Compared with Poppet Valve Construction.



Sectional Side View of American Sleeve-Valve Motor, the Cylinders and Crank Case Being Cut Away to Show the Construction.

three compression rings each and cut with oil grooves. The crankshaft is a special type, with webs cut at right angles to the centre line of the shaft, with heavy counterweights between the first and second and the third and fourth crankpins. The form of the crankshaft may be noted in the drawing of the side section and the illustration of the parts. The connecting rods are the usual I section type, the caps being each retained by four bolts, and the wristpins are conventional, oscillating in the piston bosses and being clamped in the small ends of the connecting rods by bolts.

At the forward end of the crank case is the gearset, this consisting of spiral cut gears, that on the crankshaft driving an idler, which in turn drives the gear on the shaft that drives the sleeves and the water pumps, and with which the oiling system pump is coupled. By removing the gearset cover the gears are accessible, and the main and connecting rod bearings can be reached by dropping the lower section of the crank case.

The timing of the engine is decidedly interesting. Examination of the side section drawing will show that the gears at the bases of the cylinder sleeves are helical, and the second and third sleeve gears are driven by the pinions on the timing shaft. As the gears of the first and second and the third and fourth sleeves mesh, the No. 2 sleeve will revolve from left to right and the No. 1 sleeve from right to left, and the No. 3 sleeve will revolve from right to left and the No. 4 sleeve from left to right; or, to express the result in another way, the sleeves of each pair of cylinders will revolve in opposite directions.

The timing is by turning each sleeve 45 degrees of its circumference for each piston stroke, so that, for instance, the sleeve will turn one-eighth of its external area with each stroke of the piston. The first or suction stroke begins as the port on the intake side of the sleeve is passing the intake manifold port. The compression stroke begins after the port is closed, when the sleeve makes the second of the series of eighth turns. The cylinder is fired as the sleeve begins the third eighth turn of the revolution, and the port reaches the exhaust side of the engine and begins to open with the fourth or last stroke of the cycle. The exhaust port is closed with the completion of the fourth piston stroke and the cycle is begun anew with the other side of the sleeve. The sleeve makes one revolution for each four turns of the crankshaft, and the engineering description of the timing is "four to one, with two ports."

The timing can be mechanically perfect in the sense that it is not dependent upon valve stem length or tappet adjustment, nor upon spring tension, and there is no possibility of wear that must be compensated by adjusting. Nothing can prevent the positive closing of the ports as the sleeves revolve, which can be contrasted with valves not seating from carbon deposits, from warped valve heads, from sticking guides, from worn seats, or having variable action because

of weakened springs. There is no necessity of valve grinding to insure compression and there can be no dilution of mixture from worn valve guides.

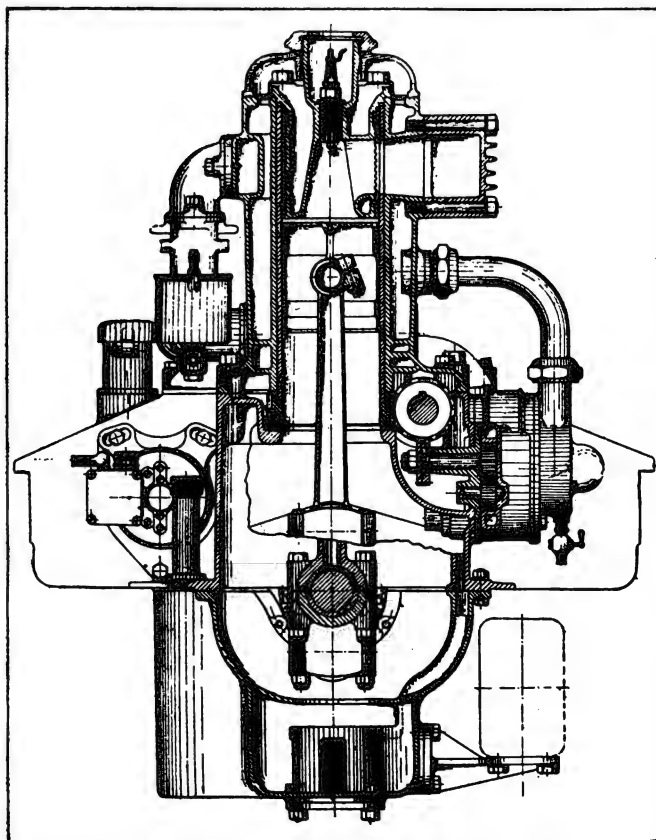
The engine is cooled by a circulation of water through the jackets forced by a centrifugal pump, and the water inlet manifold is under the exhaust manifold, while the outlet manifold is at the forward end of the block, there being nothing to prevent quick removal of the water jacket head or cover. The lubricant is drawn from a screened well in the reservoir and forced through ducts to the main and sleeve gear shaft bearings, and to the tops of the cylinders, and it is evenly distributed by spiral sleeve grooves, so that there is a uniform film of oil between the sleeves and the cylinder walls. Statement is made that there is no uncertainty as to lubrication, which obviates the variability of lubricating the V type engine. The oil thrown off by the centrifugal movement of the crankshaft and the splash thoroughly lubricates the internal walls of the sleeves, the pistons, the wristpins and the forward gearset and the sleeve gears are lubricated by the drainage from the forward main bearing and the sleeves.

Tests made with an engine having cylinder bore of four inches and stroke of five inches, which has a horsepower rating of 25.60 by the S. A. E. formula, which is obtained at 1200 revolutions a minute, show the following:

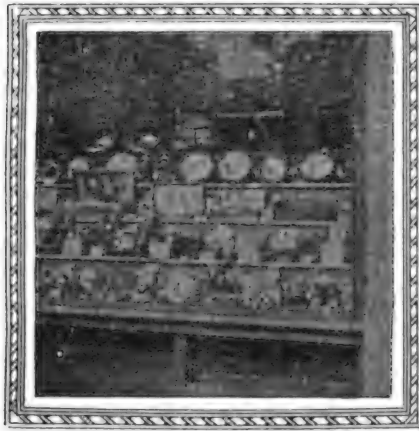
Revolutions Per Minute	Horsepower
400	4.96
600	10.20
800	20.80
1200	43.68
1600	50.88
2000	54.00
2400	56.88

The same motor ran continuously at 3600 revolutions per minute and delivered a horsepower output nearly double this with very little vibration at any speed within the entire range of speeds and loads tested.

With reference to manufacturing, statement is made that there are no processes that require special machinery, for all machining can be made on standard machines.



Sectional End View of American Sleeve-Valve Motor, Showing the Design of the Cylinder Head and the Sleeve Driving Shaft.



Accessories Department



WRIGHT ROLLER BEARING.

A roller bearing for the front wheel spindles of the Ford chassis, somewhat similar to bearings now used for high class automobiles, is being put on the market, and made by the Wright Roller Bearing Co.

The bearing is unique in that it has no cage or retaining mechanism to hold the rolls in the raceways, and it is thereby possible to use more rolls than in the conventional type of roller bearing. The makers claim an approximate increase of 50 per cent. in the number of rolls possible in the same size bearing.

This bearing has been designed because of the general tendency of engineers toward roller bearings for this particular point in chassis design. As shown in the accompanying cut, it fits the Ford spindle with no mechanical change and presents no more difficulty in installing than the replacement of the present bearings.

Marketed by the National Bearings Service Co., Philadelphia, Pa. Write for prices and literature.

TRANSMISSION LININGS.

Everyone who observes the action of a Ford car in stopping often notices that the slowing down is accompanied by a severe shaking or intermittent braking action. This is due to the fact that the brake band has a tendency to catch or grab.

To eliminate grabbing and catching the advance cork insert brake lining has been made. This lining consists of a heavy fabric in which are inserted a number of cork buttons. The action of a brake lined with this fabric is said to



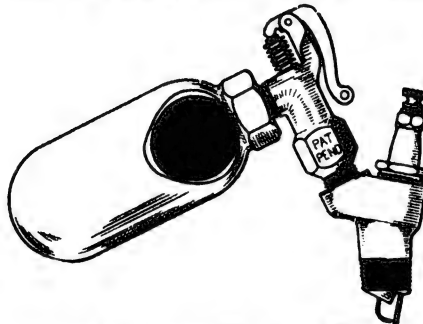
Set of Transmission Linings.

be exceptionally smooth. This fabric is sold in sets for lining the three bands of the Ford transmission.

Manufactured by Advance Automobile Accessories Corporation, Dept. K 3-1, 56 E. Randolph St., Chicago, Ill. \$1 a set of three.

BUELL EXPLOSION WHISTLE.

The average pedestrian today is wholly used to the ordinary type of automobile warning signals and frequently ignores the sound of the horn. To secure a distinctive warning note the Buell explosion



Whistle with Plug for Ford.

sion whistle has been designed. This device is made in two types, the regular type for all cars fitted with priming cock openings, and the special or Ford type for engines having a single opening for spark plug.

The device is operated by the pressure of the exploding gas in the engine, and is controlled by a valve connected by a wire to any convenient location in

the car. As the gas in each cylinder explodes many hundred times a minute, the whistle emits a number of shrill blasts when the wire is pulled, giving a warning which is distinctive and penetrative. The makers sell the device under a 10 years' guarantee and claim that it will, under ordinary conditions, last longer than the car itself.

Manufactured by Buell Co., 1610 South Michigan Ave., Chicago, Ill. Price for single tone with valve, \$4.25; chime model with valve, \$6. Special plug without whistle for Ford car attachment, \$1.25; whistle extra as above.

CAR-BON-ALE.

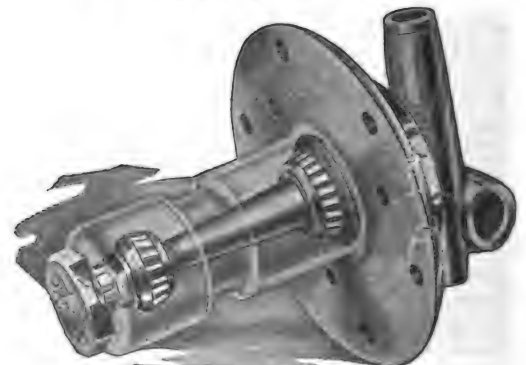
The average car owner does not realize that less than one-third of the actual value of heat units in gasoline are really utilized for power. A large percentage of power is wasted in the exhaust and cooling system, while another percentage is wasted because of poor carburetion. This latter waste is due to the high vaporizing point and raw fuel is blown out of the exhaust in many cases.

Car-Bon-Ale is a combination of volatile oils, compressed into the form of tablets. These tablets when dissolved in gasoline are said to make it more volatile, consequently increasing the car mileage to quite an appreciable extent. The manufacturers say that one box of 100 tablets will treat 100 gallons of gasoline, and when treated it is guaranteed to equal 125 gallons of gasoline in car mileage.

Manufactured by the Car-Bon-Ale Sales Co., Indianapolis, Ind. Write for prices.



A-C Carbon Proof Spark Plug.



Wright Bearing for Ford Chassis.

A C CARBON PROOF SPARK PLUG.

The manufacturers of the well known A C spark plugs have placed on the market a new type known as the A C Carbon Proof, of which a sectional view is reproduced herewith. This plug was designed primarily to overcome the carbonizing trouble experienced in a certain tractor engine using kerosene as a fuel.

The results were so satisfactory that it was decided to put the plug on the market for use in automobile engines. It is made in sizes for the Ford, Overland and Studebaker cars, and in tests on Ford cars covering a period of one year the manufacturers claim that no instance has been found where a plug was removed on account of carbonizing. The porcelain is provided with a number of ribs, having saw tooth edges, which attain a sufficiently high degree of heat to burn away the carbon, thereby keeping the edges free from deposits and eliminating any chances of possible short circuit.

Manufactured by the Champion Ignition Co., Flint, Mich. Write for prices.

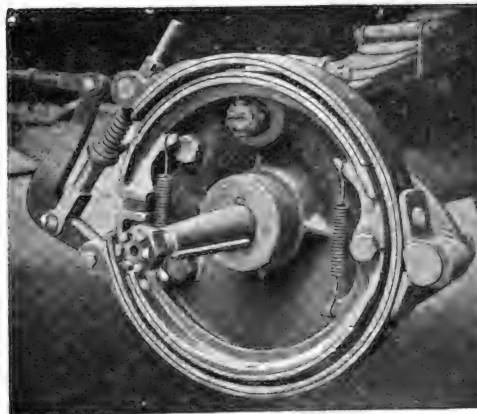
**BEACH UNIVERSAL RIM TOOL.**

The Beach Universal Rim Tool is a device designed to eliminate all of the hard work encountered in removing tires from split rims. Every autoist who has been obliged to remove and attach a tire to a split rim realizes that the work requires considerable effort. The tire must be stretched and the rim locked.

The device consists of two clamps, which are actuated by a long lever. For removing the tire the clamps are put into place and the lever pressed downward. This action releases the rim by spreading it one-quarter of an inch, raising it over the other edge two inches and carrying it by four inches, thereby contracting the rim sufficiently so that the tire can be easily removed.

The device is left in this position until the new tire is applied, when the action is reversed. It actually contracts and holds the rim, then expands and locks it in its true position in one operation without removing or changing the position of the clamps.

Manufactured by the Greb Co., 175 State St., Boston, Mass. Price, \$7.50. Liberal discount to jobbers, dealers and garages.

**Application of A-C Brake.****A-C BRAKE.**

To add to the efficiency of the Ford braking system the A-C brakes have been put on the market. These fittings may be attached to the rear axle and require no alteration of the axle or additional cross members. The brake bands are external contracting and are operated through two cables attached to the service brake pedal.

The manufacturers claim that no knowledge of mechanics is necessary to install the fittings, which may be put into place within an hour, using but a wrench as a tool.

Manufactured by A-C Manufacturing Co., Inc., 2047 W. Chicago Ave., Chicago, Ill. Price, \$15. Special proposition to agents.

THREE-POWER LEVER STARTER.

Starting the engine from the seat is one of the conveniences of the modern automobile. The Three-Power Lever Starter is a device for application to the Ford car, with which the engine may be started without leaving the car or using the hand crank. This device is connected with a foot pedal, a hand lever and a coiled spring. When one pulls the hand lever, pressure is naturally applied to the foot lever, thus distributing the

**Three-Power Lever Starter.**

power required to start the engine. The coil spring adds to the force of the pressure, so that the engine may be turned over two compression strokes.

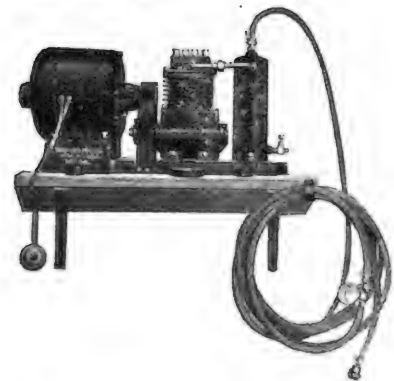
A choker valve connected to a lever on the steering column aids in starting the engine in cold weather.

Manufactured by Lanham Starter Co., 316 Le Claire St., Davenport, Ia. Price, \$22.

KEYLESS AUTO CLOCK.

What to give "him" for a holiday remembrance is always a puzzling problem, but if he owns an automobile there are many little devices which will please him to own.

Davis, the Hardware Man, corner of Portland and Sudbury streets, Boston, Mass., makes an attractive offer this holiday season of a special form of automobile eight-day clock which should be very acceptable to the motorist who takes pride in the appearance of the car. This clock, which costs \$9.50, is of the flush type and mounts on the dash or instrument board and is both wound and set through the rim, rather than by the conventional key method.

**STATIONARY TIRE INFLATOR.**

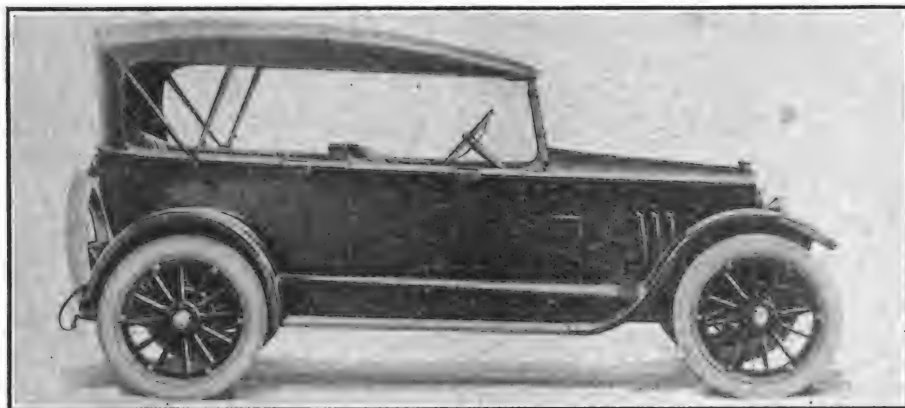
The new Brunner stationary air machine that has just been put on the market is called the No. 68 Brunner Stationary Tire Inflator. This device has two cylinders 1½ inches in diameter, with plungers having a 1½ inch stroke. Each piston is provided with three metal rings and will deliver approximately 1½ cubic feet of air per minute at a pressure of 125 pounds.

Lubrication is extremely simple and the machine is so designed that there is little danger of the lubricant working into the air line. To reduce this possibility the compressor is provided with a specially designed oil separator.

The pump is driven by a ¼ horsepower compound wound direct current or repulsion induction type alternating current motor. The two units are geared together by means of a compressed cloth pinion gear, which insures quiet running.

The whole outfit is compactly mounted and may be fastened to the wall of the garage, taking up a space of 20½ by 15 by 12 inches and weighing 90 pounds.

Manufactured by Brunner Manufacturing Co., Utica, N. Y. Write for prices.



Hackett Five-Passenger 1918 Touring Model, Showing Markedly the Straightline Characteristic on an Attractive Body.

Hackett Showing Modish 1918 Line

Details of New Models Include Racy Lines, Mechanical Correctness and Satisfying Riding Qualities.

DISTINCTIVE body types are characteristic features in the Hackett Motor Car Co.'s line for 1918, which includes the Ultra-Four touring car and speed boat type, the former a fully equipped five-passenger model and the latter a four-passenger roadster with separate entrance to front as well as rear seats.

The new Hackett bodies were designed to meet the longings of motorists for individuality, but no attempt was made to create a freakish model or to employ extreme lines.

The seating accommodations in the speedboat body are commodious, with plenty of leg room. The rear seat is 47 inches wide and the rear compartment has 31 inches of foot room. The front seat is 41 inches in width and has 30 inches of foot room. Both front and rear doors are 20 inches wide. Upholstery is of the latest design in long French pleats. The sides are very deep and the back is upholstered over a spring cushion.

With a wheelbase of 112 inches and being light in construction, the Hackett is liberally powered with a Golden, Belknap and Swartz $3\frac{3}{4} \times 4\frac{1}{4}$ four-cylinder engine which develops $27\frac{1}{2}$ horsepower. The crankshaft has three bearings and $1\frac{1}{4}$ -inch valves. Lubrication is of the high pressure pump type and splash. Cooling is by the thermo-syphon system. The electrical equipment consists of a Connecticut ignition and Dyneto starting and lighting system. A Buick carburetor is fed by the vacuum system from a 15-gallon tank located in the rear. A disc clutch is used together with a Grant-Lees sliding gear transmission, both in unit with the engine. Drive is through a $\frac{3}{4}$ floating Walker-Weiss bevel gear axle, the torque being taken by the springs. The wheelbase is 112 inches and the wheels are of the artillery type fitted with demountable rims and $32 \times 3\frac{1}{2}$ tires, non-skid rear.

NOTICE TO READERS.

Do you want us to continue the "Overhauling the Car" stories in The Automobile Journal? If you do want them continued write us a letter, tell us why you like them, how they help you, and, if you desire any particular car not already described, written up, suggest it.

MOTOR CAR MEN FORM GIGANTIC SHELL COMPANY.

The Detroit Shell Co. with a paid in capital of \$2,000,000 was organized in Detroit within a few hours after the Automobile Industries Committee visited that city with a munitions contract of \$30,000,000. John Kelsey, head of the Kelsey Wheel Co., is president.

TO TEST "FREE ENERGY."

The House of Representatives has passed the resolution providing for an investigation of the discoveries of Garabed Giragosian, who claims to have devised a means of using a "free energy" power that heretofore has been unknown. It is expected that Thomas A. Edison will head a board of four scientists who will conduct the investigation.

NEW RI-CHARD MODELS.

The Ri-Chard Auto Manufacturing Co., Cleveland, O., announces in data received too late to list, the price of the standard Ri-Chard 1918 eight-cylinder model as \$8000, and a four-cylinder model to sell for about \$4500, to be a magnetic car with electric transmission.

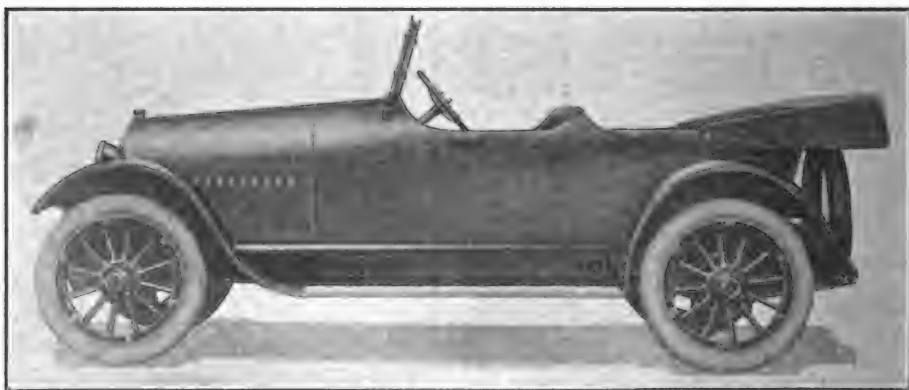
Empire Shows Classy New Car

AS IN years past the Empire exhibits at the national shows in New York and Chicago will include the company's complete line, which consists of the new 1918 models in both four and six-cylinder cars. The six is being made in a new model known as series 73, which will be the feature of the Empire booth. It is a six-cylinder, four-passenger, four-door roadster and is finished in Empire rich maroon with white wire wheels. It is mounted on the standard model 70A chassis, which carries a Continental motor, $3\frac{1}{4} \times 4\frac{1}{2}$, with a Borg & Beck plate clutch and Mechanics gearset in unit with the engine. Auto-Lite starting and lighting is employed and Connecticut ignition. The new model has a long, narrow hood line with high cowl and low body sides, giving a luxurious and racy appearance. The upholstery is genuine Spanish leather and the top fits snugly to the body and has full gypsy curtains

made integral with the back curtain. The new model 73 has a wheelbase of 120 inches and sells for \$1360 f. o. b. Indianapolis.

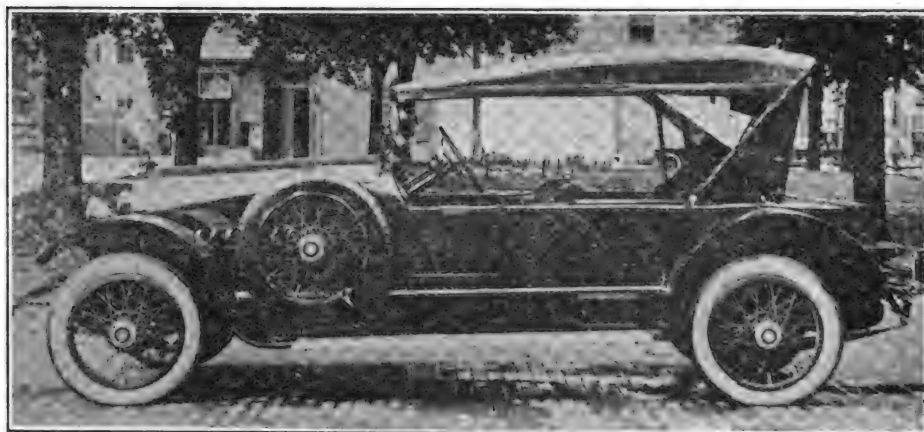
The Empire four-cylinder line will be represented in the exhibit by a five-passenger touring car, the model 50 finished in Empire green with genuine leather upholstery. The engine is a Teetor-Hartley T head engine, $3\frac{3}{4} \times 5$. Wagner ignition, starting and lighting is used and Borg & Beck plate clutch and Mechanics gearset are in unit with the motor. This model, which has a wheelbase of 115 inches, sells for \$1125 f. o. b. Indianapolis.

In addition to the seven-passenger, six-cylinder touring car, the model 70 A, which is finished in Empire brown, with genuine Spanish brown leather upholstery, there will also be exhibited a stripped chassis of the same model, finished in battleship gray with the reciprocating parts nickel plated.



New Cars at the Shows: Empire Model 73, Six-Cylinder, Four-Passenger, Four-Door Roadster, Shown for the First Time at the Palace Garden, New York.

News Notes of The Motor Car Industries



New Cars at the Shows: They Call This the McFarlan Destroyer. It is the Most Unusual of a Long Line of McFarlans Distinguished for Comfort, Appearance and Mechanical Efficiency.

The Wire Wheel Corporation of America, Buffalo, N. Y., which controls the Cowles basic patents on demountable and interchangeable wheels, has granted a license to the Hill-Smith Metal Goods Co. of Boston, Mass., to manufacture and sell the "Minute" demountable wheels for Ford cars.

The Mutual Motors Co., Jackson, Mich., makers of the Marion-Handly car, has been placed in the hands of a receiver.

The Williams Foundry and Machine Co., Akron, O., will be able to triple its capacity of vulcanizing equipment with the completion of its new plant, which will be ready for occupancy by February. The building is 275x40, three stories in height. The expansion of the plant is one of the several improvements inaugurated with the change of management of the company and the increase in the capitalization to \$2,500,000.

The Edward V. Hartford, Inc., Jersey City, N. J., in a neat booklet captioned "Indelible Impressions," tells dealers and jobbers in automobile accessories the advantages of carrying in stock Hartford equipment, shock absorbers, bumpers and auto jacks.

Charles E. Stahl, head of the sales department of the Connecticut Telephone and Electric Co., Meriden, Conn., automobile ignition systems, has been appointed assistant general manager of the company and will be assisted by W. J. Johnston, who has been appointed manager of equipment sales. P. P. Hinckley has been named purchasing agent.

Charles J. Klein, designer of the C. H. magnetic gear shift and designing engineer of the Cutler-Hammer Manufacturing Co., Milwaukee, Wis., died in that city on Dec. 17. He also invented many of the electric controlling devices manufactured by the company.

R. D. Henshaw, who has had charge of the New York and New England districts for the Michelin Tire Co. during the past 10 years, has tendered his resignation.

The Green Dragon Co., Pittsburgh, Pa., has been incorporated under the laws of Illinois with a capital of \$50,000.

The Monarch Auto Lock Co., Kenosha, Wis., has been incorporated with an authorized capital of \$100,000 to make switches, locks and other accessories.

The Sherman-Stiveson Tire and Rubber Co., recently incorporated, has acquired the plant of the F. A. Black Manufacturing Co., North Scottdale, Pa., and will use it in the manufacture of a puncture proof and tubeless tire made entirely of fabric and rubber, with a removable tread.

The Harrington Lock Co., Toledo, O.,

makers of the Halco lock for Ford cars, has been incorporated for \$25,000 and will expand its manufacturing schedule. At present the company is turning out 1000 locks weekly, but this production will be increased to 1500 within 60 days.

J. W. Peterson, a well known production man in the motor car industry for the past 16 years, has been appointed factory manager of the King Motor Car Co. He entered the motor industry in 1901 and was with the Studebaker company when it launched its first gasoline car in 1905. Latterly he has been associated with E. A. Nelson in the production of the Nelson car.

E. N. Broderick has been appointed a special representative of the Burd High Compression Ring Co., Rockford, Ill.

The Coe-Stapley Manufacturing Co. has been reorganized with \$350,000 capital as the Coe-Stapley Manufacturing Corporation, and has taken over the manufacturing and distributing rights for the Peteler Jack. The company has plants in Brooklyn, N. Y., and at Bridgeport, Conn. It will also produce a hand-operated air pump for the jobbing trade and car manufacturers. Walter C. Teter, 111 Broadway, New York City, is president.

The United States Gearshift Co., Eau Claire, Wis., which was recently organized with an authorized capital of \$1,500,000 to manufacture hydraulic gearshift units for passenger and commercial cars, has let contracts for a new factory, 65x100, four stories in height.

ACCESSORY EXHIBITORS.

(Continued from Page 19.)

Armstrong Rubber Co., Inc., of New York, New York City.
Asch & Co., Inc., New York City.
Atherley, R. J., New York City.
Au-To Compressor Co., Wilmington, O.
Auto Gear Co., Inc., New York City.
Auto Pedal Pad Co., Inc., New York City.
Automatic Carbon Eliminator Co., N. Y. C.
Automatic Transmission Co., N. Y. C.
Automobile Devices Co., Philadelphia, Pa.
Automobile Journal Publishing Co., Pawtucket, R. I.
Barnes Foundry Co., Jersey City, N. J.
Becker Bros., Chicago, Ill.
Benford Mfg. Co., Mount Vernon, N. Y.
Breeze Mfg. Co., Newark, N. J.
Brewer-Titchener Corp., Binghamton, N. Y. (Crandall, Stone & Co. Div.)
Brown-Lipe-Chapin Co., Syracuse, N. Y.
Brown-Lipe Gear Co., Syracuse, N. Y.

Brunner Mfg. Co., Utica, N. Y.
Buda Co., The, Harvey, Ill.
Byrne, Kingston & Co., Webster St., Kokomo, Ind.
Cambell Co., A. S., Boston, Mass.
Carr Universal Auto Body Co., N. Y. C.
Chadick DeLamater Corp., N. Y. C.
Chilton Co., Philadelphia, Pa.
Champion Ignition Co., Flint, Mich.
Clark Equipment Co., Buchanan, Mich.
Class Journal Co., New York City.
Century-Plainfield Tire Co., Plainfield, N. J.
Coe-Stapley Mfg. Corp., New York City.
Common-Sense Mfg. Co., Newark, N. J.
Connecticut Clock Co., Hartford, Conn.
Corbin Screw Corp., New Britain, Conn.
Corcoran Mfg. Co., The, Cincinnati, O.
Corcoran-Victor Co., The, Cincinnati, O.
Corning Glass Works, Corning, N. Y.
Cowles & Co., New Haven, Conn.
Cox Brass Mfg. Co., Albany, N. Y.
Crew Levick Co., Philadelphia, Pa.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Dann Products Co., Cleveland, O.
Detroit Kerosene Carburetor Co., Detroit, Mich.
Detroit Pressed Steel Co., Detroit, Mich.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Doehler Die Casting Co., Brooklyn, N. Y.
Du Bois Piston Ring Co., Albany, N. Y.
E. A. Laboratories, Inc., Brooklyn, N. Y.
Eastern Rubber Co., Philadelphia, Pa.
Eastern Super Spark Plug Co., N. Y. C.
Eclipse Machine Co., Elmira, N. Y.
Electric Automatic Cigar Lighter Co., New York City.
Electric Storage Battery Co., The, Philadelphia, Pa.
English & Mersick Co., The, New Haven, Conn.
Ericsson Mfg. Co., Buffalo, N. Y.
EssenKay Products Co., Chicago, Ill.
Essex Rubber Co., Inc., Trenton, N. J.
Eureka Rlm Compressor Co., Inc., Addison, N. Y.
Faw, J. H. & Co., New York City.
Findelsen & Kropf Mfg. Co., Chicago, Ill.
Foot Air Accelerator Co., New York City.
Fordham Chemical Co., Inc., L. I. C., N. Y.
Frasse, Peter A. & Co., Inc., N. Y. C.
Fulton Co., Knoxville, Tenn.
Gabriel Mfg. Co., Cleveland, O.
Gemco Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
G. L. W. Spring Oiler Co., San Diego, Cal.
Grossman, Emil, Mfg. Corp., Brooklyn, N. Y.
Gray & Davis Co., Inc., Boston, Mass.
Gould Storage Battery Co., N. Y. C.
Hale & Kilburn Co., Philadelphia, Pa.
Halliday & Co., L. P., Streator, Ill.
H. & D. Co., Inc., Goodland, Ind.
H. & N. Mfg. Co., Inc., New York City.
Hart-Bell Mfg. Co., New York City.
Harrison Radiator Corp., Lockport, N. Y.
Hartford, Inc., Edw. V., Jersey City, N. J.
Hartford Machine Screw Co., Hartford, Conn.
Hassler, Robt. H., Indianapolis, Ind.

The National Auto Shows

Under Auspices of National Automobile Chamber of Commerce, Inc.

January 5—12
at NEW YORK

Jan. 26—Feb. 2
at CHICAGO

Four Hundred Exhibits of Cars and Accessories.

S. A. MILES, Manager

7 East Forty-Second Street, New York City

Hayes Mfg. Co., Detroit, Mich.
Hayes Wheel Co., Jackson, Mich.
Heinze Electric Co., Lowell, Mass.
Herz & Co., New York City.
Helm, Geo. L., New York City.
Holophane Glass Co. Inc., New York City.
Holt-Wells Co., Inc., New York City.
Hoover Tire Carrier Corp., N. Y. C.
Horseless Age, New York City.
Houpt Machine Co., New York City.
Humbolt Machine & Stamping Co., Long Island City, N. Y.
Hydro-Eye Co., New York City.
Improved Gauge Mfg. Co., Syracuse, N. Y.
Inland Machine Works, St. Louis, Mo.
International Coat Co., New York City.
Interstate Electric Co., New Orleans, La.
Janney-Steinmetz & Co., Philadelphia, Pa.
J. & B. Mfg. Co., Pittsfield, Mass.
J. H. Tonneau Shield Co., New York City.
Jiffy Jack Co., Cleveland, O.
Juhass Carburetor Co., New York City.
Kellogg Mfg. Co., Rochester, N. Y.
Kent Mfg. Works, Atwater, Philadelphia.
K-W Ignition Co., Cleveland, O.
Keystone Rubber Mfg. Co., Erie, Pa.
Klaxon Co., Newark, N. J.
Kokomo Electric Co., Kokomo, Ind.
Lacharnay Carburetor Co., Paterson, N. J.
Lane Bros. Co., Poughkeepsie, N. Y.
Langlands, Eric, New York City.
L. Lawrence & Co., Newark, N. J.
Light Mfg. & Foundry Co., Pottstown, Pa.
Lipman Air Appliance Co., Beloit, Wis.
Lowe Motor Supplies Co., New York City.
Lubriko Co., Philadelphia, Pa.
Mann Co., F. W., Milford, Mass.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Many-Use Oil Co., New York City.
Martin, James, New York City.
Marvel Accessories Mfg. Co., Cleveland, O.
Merchant & Evans Co., Philadelphia, Pa.
Merrimack Mfg. Co., Lowell, Mass.
Metal Stamping Co., L. I. C., N. Y.
Millaire Motor Vehicle Co., Buffalo, N. Y.
Miller, Chas. E., New York City.
Miller Transmission Co., New York City.
Moreau & Pratt, Inc., New York City.
Morse Chain Co., Ithaca, N. Y.

Mosler & Co., A. R., Mount Vernon, N. Y.
Moto-Meter Co., Inc., The, L. I. C., N. Y.
Motor, New York City.
Motor Car Equipment Co., New York City.
Motor Car Spring Co., New York City.
Motor Mechanics, Cleveland, O.
Motor Vehicle Publishing Co., N. Y. C.
Mutt, L. J., Co., Boston, Mass.
National Carbon Co., Cleveland, O.
New York Coil Co., New York.
New Era Spring & Specialty Co., Detroit.
Nugo Device Co., New York City.
Pantastote Co., The, New York City.
Parker Rust Proof Co. of A., Detroit.
Parry Mfg. Co., Indianapolis, Ind.
Petty, N. A. Co., Inc., Philadelphia, Pa.
Phillips-Brinton Co., Kennett Square, Philadelphia, Pa.
Piel Co., The G., Long Island City, N. Y.
Pouvaillsmith Corp., Poughkeepsie, N. Y.
Primolite Sales Co., Westfield, N. Y.
Prismolite Co., Columbus, O.
Rand Mfg. Co., Inc., Haverhill, Mass.
Raybestos Co., The, Bridgeport, Conn.
Rex Mfg. Co., Connersville, Ind.
Rich, H. C., Auto Accessories Co., N. Y. C.
Rowe Calk Co., The, Hartford, Conn.
Saferlite Lens Co., New York City.
Schrader's Son, Inc., A., Brooklyn, N. Y.
Shakespeare Co., Kalamazoo, Mich.
Shaler Co., C. A., Waupun, Wis.
Sharp Spark Plug Co., Cleveland, O.
S. K. F. Ball Bearing Co., Hartford, Conn.
Smith Signal Corp., New York City.
Sparks Withington Co., Jackson, Mich.
Speer Carbon Co., St. Mary's, Pa.
Spencer Metal Products Co., Spencer, O.
Splidorf Electric Co., Newark, N. J.
Standard Parts Co., Cleveland, O.
Standard Welding Co., The, Cleveland, O.
Stewart Warner Speedometer Co., Chicago, Ill.
Stanley, John T., Co., Inc., N. Y. C.
Sterns Tire & Tube Co., Inc., St. Louis, Mo.
Stewart, F. W., Chicago, Ill.
Story Corp., New York City.
Stromberg Motor Devices Co., Chicago, Ill.
Stroock, S. & Co., New York City.
Super Lighting Co., Inc., New York City.

Superior Lamp Mfg. Co., Inc., N. Y. C.
Syracuse Malleable Iron Works, Syracuse, N. Y.
Taft-Pierce Mfg. Co., Woonsocket, R. I.
Triple Action Spring Co., Inc., New York.
Twin Fire Spark Plug Co., Detroit, Mich.
U-Auto-C Corp., New York City.
United Engine & Mfg. Co., Hanover, Pa.
U. S. Air Compressor Co., Cleveland, O.
U. S. Gauge Co., New York City.
Universal Tool Co., Inc., Detroit, Mich.
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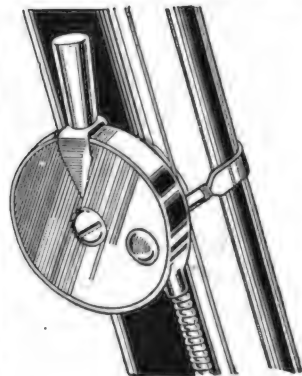
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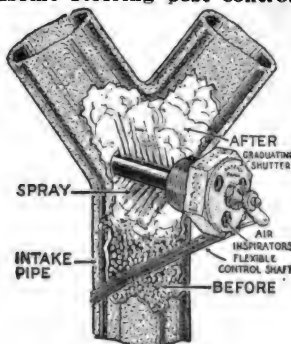


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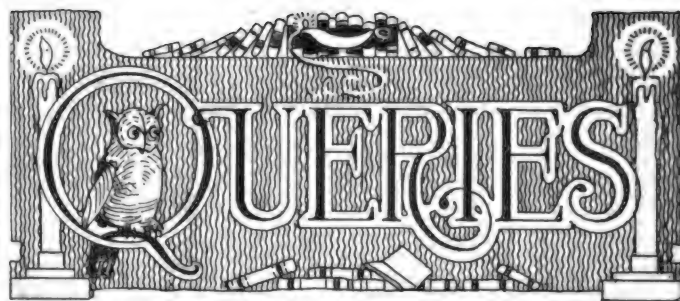
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU LUBRICATE SPRINGS AND WHAT METHODS DO YOU USE TO KEEP THE LUBRICANT FROM ESCAPING?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 20th of January. The contest is open to every one.

STARTING THE ENGINE IN COLD WEATHER.

(R. L. Prindle, N. Abington, Mass.)

Best Letter.

With weather as bitterly cold as that already experienced this winter owners of motor cars are facing the serious problem of starting the engine at low temperatures. Since the temperature of the radiator largely effects engine starting and during the night the water cools considerably, starting will be difficult. As gasoline does not vaporize at very low temperatures, and, as it is only explosive when in the form of vapor, it follows that a cold engine will require considerable effort to get it to run under its own power.

The simplest and perhaps the most common means of accomplishing the end in view is the application of hot cloths or the pouring of hot water over the intake manifold, priming with high test gas or ether, or the injecting of ether through the carburetor air intake.

It is always advisable to have the carburetor adjustment set to "gas" or "rich" until the engine has warmed up through running to a good operating temperature. When the mixture may be cut down. Where a car is fitted with an acetylene tank for lighting, the gas may be used through the manifold or carburetor air intake, with much success.

With the present day use of heavy fuel, which has a high percentage of kerosene and a high vaporizing point, some form of heat application is necessary to secure even running. Usually a pipe connected with the exhaust unit and to the intake line solves the problem. The heat from the exhaust being collected by means of a hot air stove.

Cooling and circulating systems are designed to function best at an average temperature; for this reason the radiator

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should be partially covered in extremely cold weather. If a temperature indicating device is fitted to the radiator filler cap, care should be taken that the temperature does not rise above 190 degrees. The radiator may be covered so as to keep the temperature as near this figure as possible. Too much radiator area causes the engine to skip, a loss of power and reduces the efficiency of combustion as well as requires more gasoline.

A cold engine condenses the fuel and permits the raw gasoline to enter the cylinders and run down past the rings into the crank case, diluting the lubricant and reducing its efficiency, thereby causing depreciation of the whole engine.

With the advent of the high speed engine it is none too easy to maintain a film of oil within the cylinder under the best of conditions, and this reduction of the lubricant by raw fuel presents a serious problem, unless extreme care is exercised.

Many engines now on the market are fitted with devices for controlling the circulating area, or for controlling the water circulation. These devices are set to keep the temperature between 150 and 190 degrees as far as possible. This range of temperature, being an ideal one, so to speak, may be closely followed when fitting devices to the engine.

AN EASY METHOD FOR STARTING.

(W. S. Leach, Taunton, Mass.)

Second Best Letter.

Perhaps the easiest method of starting an engine in cold weather and one that is cheap as well as effective is as follows:

Saturate a small sponge with ether and place it in the carburetor air intake, then start the engine in the usual way. I have found this method to be superior to many that I have tried. The fumes from the ether are very explosive and furnish enough vapor for three or four explosions. By that time the manifold will be sufficiently warmed to permit the engine to run on the regular fuel.

After the engine has been started the sponge should be removed. If the carburetor is fitted with a hot air pipe the pipe may be removed before inserting the sponge.

VARIANCE OF COMPRESSION IN CYLINDERS.

(T. K., Dorchester, Mass.)

My Ford car 1912 does not run as well as I think it should. It lacks power. Can you tell me how to replace the valve bushings and how to determine when this is necessary? Three of the cylinders show a compression of 40 pounds per square inch while the other shows 60. What shall I do to remedy this trouble? Would you advise me to fit a hot air stove to the carburetor, or will the present equipment be all right?

There is evidently some trouble with either the piston or explosion chamber in your engine, for there should not be such a variance of compression between the three cylinders and the fourth. We would advise you to make a series of measurements of both the pistons and cylinder head to determine the reason for this difference. First place a straight edge across the planed edge of the cylinder head, then measure the depth of the explosion chamber. Make a rough sketch of each one, taking measurements at the sides and middle, and compare them. If you have a defective casting possibly one of the explosion chambers will not be as large as the others thereby increasing the compression in that particular cylinder.

It may be that one of the pistons extends into the explosion chamber farther than the others. With the head removed from the cylinder block bring two of the pistons to the top of their stroke and measure the distance they extend above the block. Make comparisons with the others and should one of them extend more than the others, it should be replaced with new.

The valve stem guides in this model may be driven out by using an iron rod, slightly larger than the valve stem, placing it against the bushing through the top of the block and driving with a hammer. In putting the new ones in place be sure to drive against them with a block of wood or the edges

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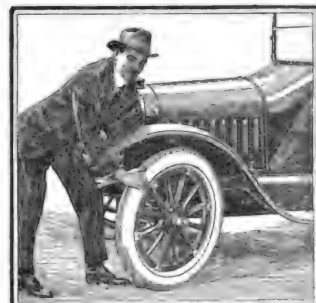
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will be damaged and the valve stem will bind. The valves should work freely in the guides, but should have no side play. To secure perfect fit you may be obliged to replace both the guides and valves. It is essential that the fit be perfect however.

The clearance between the valve stem and push rod or tappet should not be more than $1/32$, nor less than $1/64$ of an inch. The correct clearance should be about $3/32$ of an inch when the engine is cold.

Unless you are sure that the present carburetor is at fault we would not advise you to change it. We would suggest, however, as in our last letter, that you equip it with a hot air stove, larger than the regular stock connection now on the car. If you choose you may make such a device yourself. Procure a length of tin about six inches long and bend it into a tube $3/4$ of an inch larger in diameter than the muffler pipe. Fit each end of this tube with a cap (a tin box cover makes a good cap) and bore a hole in each cap just large enough to permit it to slip over the exhaust pipe. Around the lower edge of the tube bore a number of $1/4$ inch holes to admit fresh air, and at the other end bore a large hole and rivet the regular hot air carburetor pipe to it.

WIRING A MAXWELL CAR.

(J. F. L., Stratford, Conn.)

I have a Maxwell 1913 car equipped with a Splitdorf magneto and coil and have removed both the magneto and coil so that I do not know how to replace the wiring. Can you tell me how these units are wired?

We are sorry that you did not give us more details to work upon for there were three Maxwells made in 1913. Two of these companies have gone out of existence and we have no diagrams covering the car. As a general rule, in the older cars, the ignition systems were stock units. All stock units were marked with serial numbers or type numbers and the terminals were identified by letters or numbers which had a certain significance.

One manufacturer might have put out one magneto, but three types of coils the same year; either coil might have been used with the magneto. The switch might have been made in a great number of styles, either attached to the coil or separate from the coil. These statements are true of the Splitdorf equipment as manufactured up to 1913. The writer has in mind three types of Splitdorf equipment.

The standard Splitdorf system used on a number of the 1913 cars consisted of a round or square coil with switch attached and a magneto fitted with distributors for either four or six cylinders.

The magneto is fitted with three terminals (this in addition to the five or seven on the distributor). The first of the terminals, marked A, located at the centre of the breaker box; the second, marked 2, on the side of the breaker box, and the third, marked 3, on the lower corner, grounded to the machine.

The coil box is fitted with six terminals. The two on the top are connected with the battery. The lower end is fitted with three in a row marked 3, A and 2. The terminal 3 is near the edge of the box. These terminals are connected with the magneto terminals bearing similar markings. The fourth large binding post on the bottom of the coil is connected with the centre terminal of the distributor.

If this wiring does not correspond in markings with your equipment, let us hear from you, giving us the markings on your magneto and coil box and we will advise you further.

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The Greer College of Motoring, 1519 Wabash avenue, Chicago, Ill., have issued a neat little booklet entitled, "Rules of the Road," which contains the essential information for motorists to observe the laws of Illinois and ordinances of the city of Chicago, regulating the operation of a motor car. The points covered apply also in practically all states and are of interest to car drivers everywhere. The booklet will be mailed free upon application to the school.

THE HUDSON SUPER-SIX.

(Continued from Page 48.)

splash. From the oil base oil is pumped by a plunger arrangement mounted on the distributor unit to the front compartment containing the timing gears and from thence into the trough beneath number one connecting rod.

As the crankshaft revolves the connecting rod splashes the oil from this trough into a gutter mounted on the side of the crank case, which in turn feeds number two connecting rod trough. From this trough the oil is splashed to a second gutter and thence falls to the third trough, and so on until all of the troughs are filled, the surplus oil running back into the reservoir.

Following the Oil Distribution.

Part of the oil splashed from the connecting rods is distributed through a second set of troughs to the main bearings, while the rest of the splash or mist provides lubrication for the cylinders, wrist pins and cams.

To increase the supply of oil at high speeds the pump is fitted with a connection to the throttle rod, which, through an eccentric and cam arrangement, increases the pump plunger stroke with the opening of the throttle and the consequent increase of engine speed.

The oil pump, as well as the Delco distributor unit, are driven by the same shaft from the pump driving gear. To disassemble it, first remove the distributor and breaker box unit, which is fastened to the pump housing by four cap screws. With the screws removed the timer unit may be lifted off and the two pump housing cap screws taken out, permitting the removal of the pump unit from the crank case.

All of the oil tubes, as well as the pump itself, should be given a thorough cleaning and rinsed with kerosene oil. A flexible copper wire may be used for cleaning the tubes. When the pump has been replaced and before the engine is started the pump should be primed with oil through the priming cup provided for that purpose, or through the plug in the side of the pump. In a newly overhauled engine it is important that the oiling system become operative immediately upon the starting of the engine and for this reason the oil troughs should be filled with oil before the oil base or reservoir is replaced.

The next step in the overhaul is the removal of the timing gear case. Before this can be done the large right hand threaded nut which fastens the fan belt pulley to the crankshaft must be taken off. The fan belt pulley may then be pulled from the shaft, the timing case cover screws removed and the cover taken off, exposing the timing and pump gears.

Next remove the nut on the end of the pump shaft and pull off the pump gear. Then disconnect the pump from the generator shaft by removing the coupling bolts, and remove the pump housing retaining screws. The pump may then be taken from the crank case. With the pump will be taken the pump shaft front bearing, which is mounted in the front of the timing gear case together with the timing unit drive gear.

Disassembly of Pump Unit.

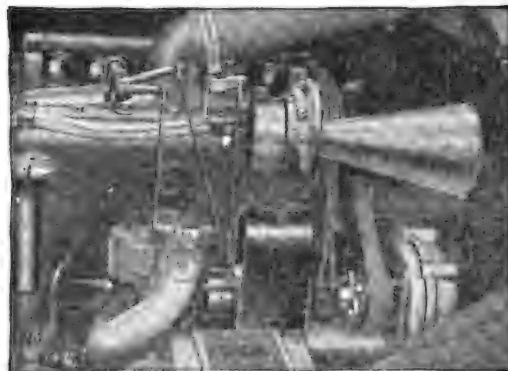
Complete disassembly of the pump unit is accomplished as follows: Remove the taper pin and pull off the pump shaft coupling, then unbolt and separate the two parts of the pump housing. The pump impeller is retained by a taper pin and key and must next be taken from the shaft, permitting the removal of the front pump housing and the front bearing housing. The taper pin may then be driven from the timer gear and that gear pulled from the shaft, completing the disassembly.

With the complete unit installed on the engine there should be not over 1/64 end play in the pump shaft. Excessive play is removed by inserting shims between the timer gear and the front pump bearing in the timer gear case.

The latter bearing may be removed from the front of the engine after the four retaining cap screws have been taken out. In replacing the pump impeller blade be sure to have the blades replaced in the proper direction of rotation or the pump will remain inoperative.

With the front of the timing gear case removed the camshaft may be pulled from the engine. Before taking out the camshaft, however, the push rods should be wired or tied at their topmost point so that they will not interfere with the cams as the shaft is drawn forth.

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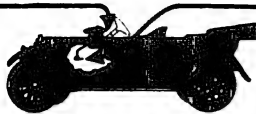
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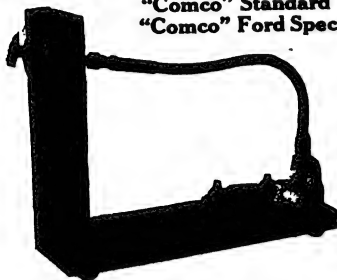
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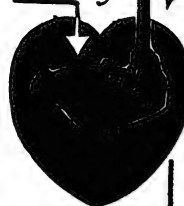


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After the camshaft has been taken out the push rods may be removed from the inside of the engine and the push rod guides driven out from the inside, providing inspection shows the necessity of replacement of these parts.

If the cylinders are to be removed from the engine the exhaust manifold should first be disconnected at the coupling, then the retaining cap screws taken out and the manifold removed. The carburetor should next be taken off and the cylinder block cap screws removed, permitting the lifting off of the entire block.

Disassembly of Power Unit.

The engine is suspended at four points and bolted to the frame by two bolts at the rear and one in the front on each side. This unit should not be removed from the chassis until the transmission has been taken from it.

In removing the transmission from the engine, first disconnect the control rods and the universal joint and remove the gear change and emergency lever mounting from the top of the transmission. Then remove the bolts and cap screws which fasten the bell housing of the gearset to the flywheel housing, leaving the extreme top bolt tightened in position. After sufficient help has been obtained to insure proper management of this unit, unscrew the nut from the top bolt and draw the transmission back from the engine unit in an absolutely straight line until the pilot shaft has cleared the engine. To insure lining up of this unit while being removed the top bolt should be left in place, acting as a guide. If proper precautions are not taken there is great danger of straining or bending the pilot shaft.

The clutch unit is contained in the flywheel and when the clutch pedal is depressed the spring tension is taken by the pedal arm or fork. Press down on the pedal and remove the 12 cap screws which fasten the clutch cover to the flywheel. Upon the release of the pedal the cover will be forced off and the clutch discs out until the clutch spring expands to the length of the clutch spring bolt, when it will cease to exert pressure on the discs. The pedal may then be unbolted and the entire clutch assembly slipped from the flywheel. Under no conditions should the nut be taken from the clutch spring bolt, unless the spring is compressed beneath an arbor press, since the spring exerts a pressure of many hundred pounds.

Overhaul of Clutch Units.

Between each pair of driving discs, which are mounted on the four steel studs in the flywheel, are small springs. The purpose of these springs is to expand the clutch discs as the clutch spring pressure is removed and permit the driven cork faced discs to rotate between the driving discs freely.

In assembling the clutch great care must be exercised or these little springs will slip out of place and becoming jammed between the revolving parts, cause the clutch to drag instead of releasing properly.

When the clutch unit is to be assembled ready for inserting in the flywheel, the clutch drum should be placed on the bench and a cork insert disc placed over it, then a plain disc, then a cork insert disc and so on until all of the discs have been put on the drum. After all of the clutch discs have thus been assembled the assembly should be slowly slipped on the studs of the clutch cover, and as it is slipped on the studs a small spring should be placed on the studs between each pair of driving discs. The spring, ball thrust bearings and shims are then placed in the crankshaft and the clutch unit put into place. The cap screws fastening the clutch cover to the flywheel are usually sufficiently long to compress the clutch spring.

Where it is desired to increase the clutch spring tension, thin washers or shims are placed in the crankshaft before the spring is put into place. If the spring is too long to permit the catching of the clutch cover cap screws, a lever may be used looped into a wire which is wound around the engine and forced against the jaws of the clutch to force the clutch cover against the flywheel and permit the catching of the cap screw threads.

Operations on the Transmission.

The disassembly of the transmission is a simple matter. The universal joint flange, which is retained by a lock nut and keyed to the shaft, is first removed. Then the bearing

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covers on both ends of the main and counter shafts taken off. The removal of the main shaft covers will permit the taking out of the pilot shaft, as well as the driving gear. The rest of the sliding gears will then slide from the main shaft as that member is taken out from the rear.

After the main shaft has been taken out the two counter shaft roller bearings are removed and the countershaft with gears attached can be lifted out from the inside of the gear set.

The reverse idler gear, which runs on a roller bearing, can be removed when the stud has been removed from the rear. This stud is held in place by the countershaft rear bearing cover.

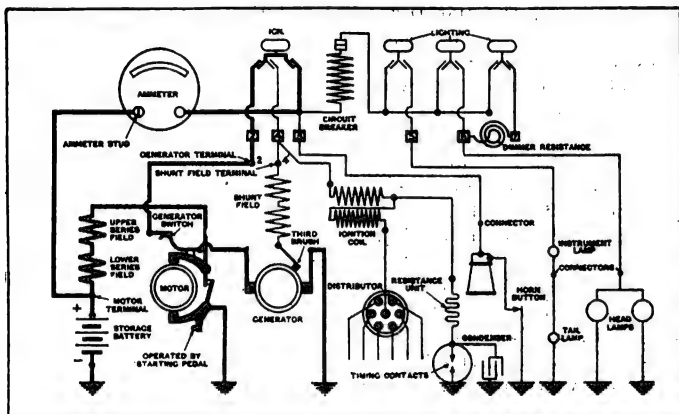
Unless the countershaft gears show signs of wear and require replacement, they should not be removed from the shaft. These gears are all keyed to the shaft and may be removed by means of a wheel puller.

End play of the countershaft should not be more than .012 of an inch and may be adjusted not closer than .004 of an inch by the insertion of shims between the front bearing cap and the roller bearing.

An allowance of .007 of an inch and .004 minimum is made for end play of the main shaft. Excess play in this member is compensated for by the removal of shims from between the rear main bearing retainer and the housing. If all the shims are removed and the play is more than .007, the bronze or steel thrust washers should be replaced with new.

Overhauling the Rear Axle.

Where the rear axle is to receive an overhaul it should first be supported with both wheels free from the ground.



Delco Wiring Diagram. System Used on Hudson Super-Six.

The hub caps are then removed, the lock nut taken off and the wheels pulled from the taper shafts. The clamping bolts which fasten the shaft adjusting nuts should be loosened and the adjusting nuts removed with a special tool furnished for that purpose. The shafts may then be taken from the housing.

The housing in which the pinion gear is mounted is next removed from the rear axle housing. With the former the differential, pinion gear and all bearings is taken. After the rear universal joint has been disconnected at the flange the flange lock nut should be taken off and the flange pulled from the pinion gear shaft.

Before the pinion gear can be removed the differential must be taken from the casing. This unit, together with the adjusting nuts and bearings, is held in place by two caps on each side. Remove these caps and lift the differential from the case and the pinion gear may then be slipped from the inside.

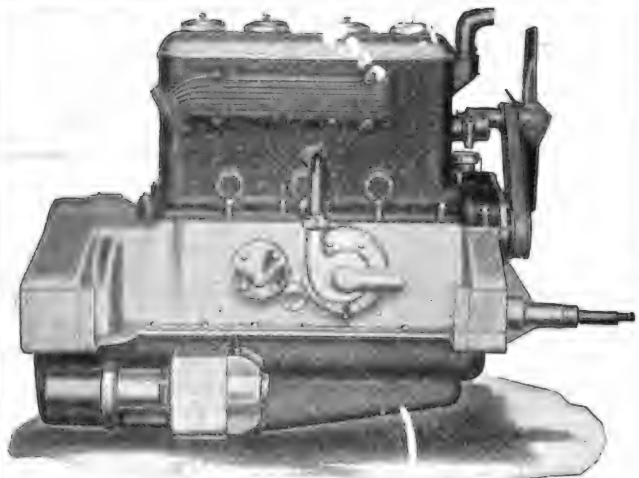
Unless the pinion gear bearings show wear and need replacement, the front and rear bearing adjustments should not be disturbed, for if the bearings are left in place the adjustment of the master and drive gear is an easy matter.

To remove the pinion bearings the two lock bolts should be removed, the adjustment lock taken out and the bearing adjustments turned, forcing out the bearings, together with the adjusting collars or screws.

Replacements in Differential.

The differential is disassembled by the removal of the

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cap screws holding the two parts together. When this is done the differential gears, pinions and spider can be taken out. While the differential gears are out of the housing they should be tried on their respective shafts. There should be little or no play between the differential gears and the shafts or between the pinion gears and the spider shafts. Replacement of the parts worn is the only remedy for play in the differential.

A careful examination should be made of the rivets holding the master or ring gear to the differential housing. All of the driving strain is taken through the rivets and it is essential that they fit the holes in the gear and housing or they will quickly shear off.

To obtain smoothness of action and long life of the gears, proper relationship between the pinion and master gear is necessary. In assembling the differential and pinion gear unit the pinion gear with its bearings and adjusting nuts is first put into place, then the differential is mounted on its bearings. The two gears are then adjusted so that the back face of the teeth are flush. To bring them in this relation the two adjustments on each side of the differential are turned, as well as the rear adjustment of the pinion gear.

After the gears have been brought to the proper relation the front pinion gear adjustment should be turned until the pinion gear shaft, upon which the universal joint flange has been fastened, has but very little end play. A wooden handle should then be fitted to the universal joint flange and the pinion gear turned. This gear should turn freely and smoothly without clash or grind and the adjustments should be made until it does.

A slight amount of end play should be allowed in both the pinion gear and the differential or the roller bearings will be destroyed very quickly. This same thing applies to the wheel shaft adjustments.

The steering gear is of the worm and wheel type, both the worm and wheel being accessible by the removal of caps over these parts. An allowance of not over 1/64 of an inch end play is made in both the worm and wheel shaft. Excess play in the steering column is taken up by the removal of shims between the housing and the cover. Play in the wheel is taken up by the nut and stud adjustment in the worm wheel cover. Where the play between the worm and wheel is excessive the eccentric bushing may be turned to compensate. This adjustment is located back of the steering arm and is kept from turning by a lock screw.

Timing and Adjustments.

The valve timing of the Hudson car should be adjusted before the timing gear has been placed on the crankshaft. Turn the crankshaft over until the piston in number one cylinder has traveled down from the top of its stroke 1/64 of an inch. Then turn the camshaft in its proper direction of rotation (toward the left) until the intake valve of number one cylinder has just started to open. The gears should be meshed at this point. The timing may be checked by the following data: Inlet closes 17/32 after bottom dead centre; exhaust opens 57/64 of an inch before bottom dead centre and closes 1/32 of an inch after top dead centre.

With the spark lever advanced the spark should take place in the cylinders 5/8 of an inch before the top of the piston stroke is reached. To set the ignition unit put it into place on the engine, and turn the crankshaft until the piston in number one cylinder is 5/8 of an inch before the top of the firing stroke. Both valves should then be closed.

Next remove the distributor head, take off the distributor arm or brush and loosen the screw in the centre of the cam. The cam may be pulled or pried upward until it rotates freely upon the shaft. Set the spark lever at advance position and replace the distributor brush. Turn the cam and brush until the brush comes beneath the distributor segment connected with number one cylinder, then remove the brush again and turn the cam forward until the breaker points are just beginning to separate. Then tighten the screw and replace the brush and head.

Aside from cleaning the carburetor requires no special attention or adjusting. In assembling this unit be sure that the arrow on the bell points in the same direction as the open end of the V groove, and that the arrow also points in the same direction as the arrow on the throttle body.



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From National Automobile Chamber of Commerce,
7 East 42nd Street, New York, August 27, 1917

Embargoes Affect Motor Car Exports

Thirty-five Per Cent. Decrease in Shipments to Great Britain, France and Russia During Last Fiscal Year—Big Increases to All Other Countries—Shipments Total 80,811 Cars, Valued at \$90,958,243—Thirty-three Hundred More Vehicles Exported, But Aggregate Value is \$6,507,000 Less—Few Trucks and More Passenger Cars.

Figures just issued by the Department of Commerce show that during the 12 months ended June 30, 1917, the United States exported 80,811 automobiles and motor trucks, valued at \$90,958,243, as compared with 77,499 cars, valued at \$97,465,811 during the preceding fiscal year.

Analyzing the official figures, the National Automobile Chamber of Commerce finds that the increase in number of cars exported is due to the larger shipments to most countries outside of Europe, which more than offset the decreases in exports to Great Britain, France and Russia, due to import prohibitions and lack of shipping facilities.

The fact that the aggregate value of exports during the last fiscal year was less by \$6,507,000 than in the preceding year, while the actual number of vehicles exported was greater by 3312, is due to decreased shipments of trucks for war purposes, the average value of which is much higher than the average value of passenger cars exported to countries outside of Europe.

Exports of commercial vehicles and passenger cars during the two years were as follows:

	1916		1917	
	No.	Value	No.	Value
Commercial....	21,265	\$56,805,548	15,977	\$42,337,315
Passenger.....	56,234	40,660,263	64,834	48,620,928

Thus, while the number of trucks exported fell off 5288 in the year and their aggregate value was \$14,468,233 less, the shipments of passenger cars increased by 8600 and their value by \$7,960,665.

Great Britain and France were still our largest markets, despite their heavy falling off in purchases. The former bought \$18,508,442 worth last year, mostly trucks, as against \$26,147,232 worth in the previous fiscal year. France's imports were nearly all trucks and amounted to \$14,691,460, as compared with \$19,137,904 in the 12 months ended June 30, 1916.

Owing to shipping difficulties and internal political

troubles, Russia's imports fell from a value of \$15,686,874 in 1916 to \$6,371,982 in the last fiscal year.

Exports to the rest of Europe combined increased remarkably, when it is remembered that no shipments went to the central empires. The increase amounted to more than \$1,000,000 in the year, accounted for largely by exports to the Scandinavian countries, Holland and Spain. Europe as a whole took slightly less than one-third by valuation of the total American exports.

Aside from the European countries, Canada is America's best customer for motor cars, having increased her purchases by nearly \$4,200,000—from \$7,280,151 in 1916 to \$12,088,787 in 1917.

Next comes Asia and Oceania, with imports of 9716 cars, valued at \$10,093,720 last year—an increase of \$1,450,927. Australia follows, with 5000, valued at \$4,213,874. The British East Indies increased their purchases from \$2,307,739 to \$3,617,351.

In the Americas, after Canada, the West Indies were our best market for automobiles, to the extent of \$4,072,647—an increase of \$1,248,735 over the year before.

The most remarkable increases, however, are shown by Mexico and the South American republics. Mexico's commercial recovery is reflected by an increase from \$409,700 to \$1,833,975 in the year. Argentina's imports reached nearly \$2,500,000. Brazil's trebled. Chile's prosperity from her nitrate mines resulted in an increase from \$576,777 to \$1,982,538. The rest of South America took automobiles to the value of \$1,804,827, as against only \$698,911 the year before.

In addition to automobiles the United States exported in the last fiscal year 23,435 automobile engines, valued at \$2,844,406; tires worth \$12,330,201 and parts worth \$27,284,932.

This makes a grand total of \$133,417,782 of foreign automobile business done by the country last year, which means a lot of money in the pockets of American workingmen.

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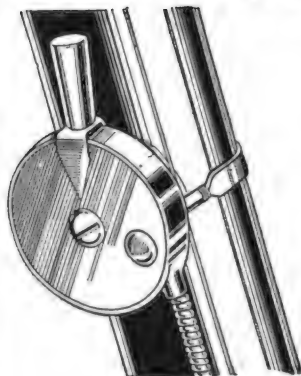
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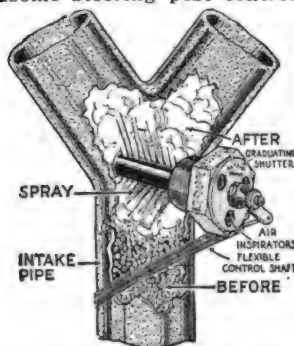
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Selden 36 H. P., \$60—Overland 86-6, \$100
Cadillac 1909, \$60—Overland 90, \$125
Peerless 40, \$75—Case 1911, \$75
Henderson, 4 cyl., \$75—Moon 1912, \$75
Mitchell 6-1912, \$85—Stearns 1911, \$75
Speedwell 40 h.p., \$85—Velle 40 1912, \$85
Chalmers 6-1915, \$125—App'r'n 6-48, \$125
Velle 4-1915, \$125—Packard 30, \$150
Packard 18, \$125—Apperson, 8 cyl., \$200
Menominee Truck Unit Plant, \$100
Abbott-Detroit 4-1912 Unit Plant, \$100
King 1914 Unit Plant, \$125.
Chalmers 36-1912 Unit Plant, \$125
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Oldsmobile 8 cyl. Unit Plant, \$200
Cadillac 8 cyl. Unit Plant, \$300

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Strangling the Periodicals

Congress at its last session passed a hasty postal law increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT.

Some periodicals will be killed—all will be restricted in circulation and crippled. There will be fewer readers, and the habit of reading curtailed. The great function of periodicals is to assist in the spread of ideas—by printing the achievements in the world of thought, culture and science.

Thus to shut out farm journals—as these zone rates will—will lessen the productive power of our country by millions of dollars through loss of better methods. Shut off trade journals and you decrease the manufacturing power by more millions. Shut off the religious papers and there are shut off channels that have raised millions of dollars for distressed humanity. Shut off the great periodicals of the home and there is throttled an avenue that has given expert instruction to hundreds of thousands of mothers and saved their babies to health and citizenship.

These national periodicals are printed in the big cities—and the first zone, the cheapest zone, is in or near those cities; there are many educational opportunities near cities, and the cities will read anyway. Small towns and distant districts depend to a large extent upon periodicals; thus this law increasing periodical postage where it is most needed shuts off opportunity where needed. It penalizes periodical readers.

Repeal this law. Repeal this FIFTY TO NINE HUNDRED PER CENT. periodical postage increase. Sign the petition below and mail it. Put a cross mark in the square—save the periodicals and the work that they have done and are doing for national education and patriotism.

SIGN BELOW

CUT OUT. MAIL TO CHARLES JOHNSON POST, Room 1417, 200 FIFTH AVENUE, NEW YORK CITY

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The spread of education, of culture, of scientific knowledge and advancement, and of our vast internal merchandising and manufacturing has been, and always is, vitally dependent upon the freest and cheapest circulation of periodicals. The penalties resulting from any restriction on the freest possible circulation of periodicals will be destructive of the best interests of our economic life and the opportunities of developing our best citizenship.

The postal amendment passed by the last Congress increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT. will throttle or destroy our periodicals at a time when the widest and most extensive circulation of publications is essential to the patriotism, education and upbuilding of our country.

Therefore, I the undersigned, do most earnestly demand the repeal of this burdensome periodical postage amendment.

Name.....

City or County.....

Street Address.....

State.....

Periodicals mean much in your life. If you will help by a few arguments with your acquaintances and an occasional letter in a spare moment, put a cross mark here.



Will you help in securing the repeal of this iniquitous law? ☐

CUT OUT. MAIL TO CHARLES JOHNSON POST, Room 1417, 200 FIFTH AVENUE, NEW YORK CITY.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

NEW YORK

CHICAGO

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DETROIT

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Canada, \$2.50 a year.
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JAN 10, 1918.

NO. 11.

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Treasurer . . WILLIAM H. BLACK
Secretary D. O. BLACK, JR.

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WITH the coming of the New Year the national automobile shows bring a new spirit into motordom. The first of the shows of 1918, the great New York exhibition, is notable as the first war time show. It proved the stability of the industry under war burdens and the certainty of the great part that motor cars will play in the coming season and future years. One of the chief reasons for the adoption of the automobile was the inadequacy of the horse. Now that there is insufficient rail transportation, an even wider field of operation is offered to the passenger motor car.

THOUGH the government has cut off drawing room cars from railroad trains and discontinued many passenger trains that are not considered strictly necessary, the modern motor car saves the man of affairs from great inconvenience. The man with a high powered, safe, swift passenger motor car, certainly need not be dismayed. Splendid roads connect New York with the large number of large cities nearby. Had it not been for railroad curtailments the individual transportation service to be had by means of the motor car for distances from 25 to 200 miles might never have become so thoroughly appreciated as an actual means of saving time. The same is true of Washington, Pittsburgh, Chicago, Philadelphia, Boston, Memphis, New Orleans, Kansas City, Denver, Los Angeles and many other cities. With the capable, thoroughly dependable motor car the business man may leave as early or as late as he pleases, need not be delayed by the various things that so often make railroad trains late, and, after he has reached his destination, he has the use of his own car while in town.

DETAILED accounts of the services rendered to motorists who hold membership in the National Automobile Association are found on page 26 of this issue. The concrete good that comes with cooperation is found exemplified in the pages of the section devoted to the news, aims and accomplishments of this association. New features of service are being prepared, in regard to which announcement will be made in later issues. Membership the coming season is a very desirable asset to motorists.

THE call for a continuance of car overhaul stories increases amongst our subscribers. Not all have been heard from as yet who probably wish to express themselves. Write to the Automobile Journal, tell just exactly what you think and what information may be added that will be of service to your motoring. Those who have made inquiries for their particular car will be accommodated as promptly as possible.

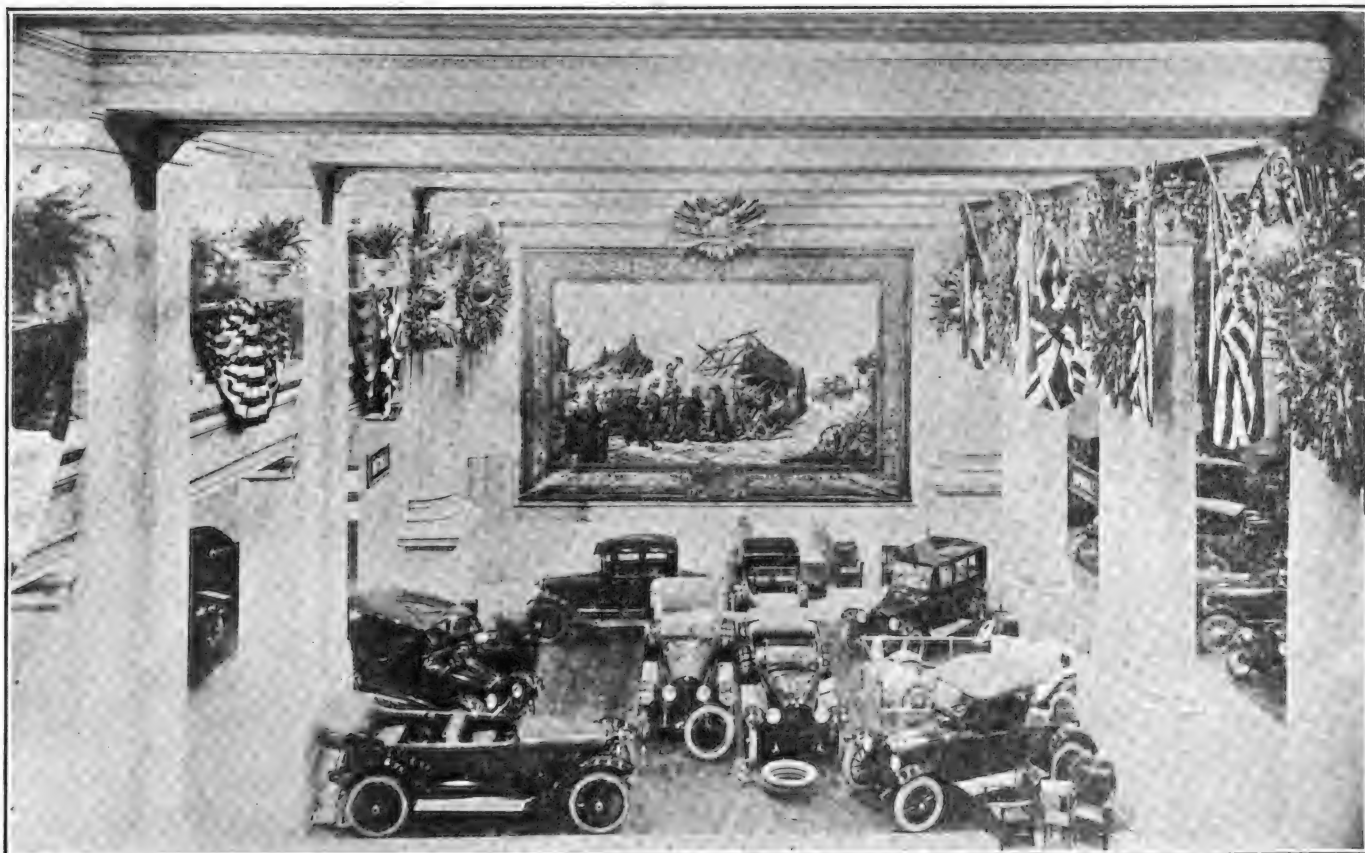
LIVE topics to be taken up the next issue include how to prepare a car for resale, the motoring outlook, conservation of the car and the usual wide variety of practical hints, descriptions of new cars and the newest accessories. Building tendencies in the motor car industry will be treated soon in a special article by an expert. With all these features the new year is most promising in its outlook. They fulfill a popular need for motor car knowledge in this most extraordinary year, when everything in this journal is prepared with the view to aid the general determination to win the war, inspire every motorist to maintain this patriotic purpose and assist him in every way possible to do so. The motor car starts the new year with the fact of its indispensability fully proved.

THE Automobile Journal

LXIV.

JANUARY 10, 1918.

NO. 11.



Centre of Main Floor, Grand Central Palace, with the Principal Feature of the Decorative Scheme, the Painting, "The Hour of Deliverance," in the Background.

Trade Optimistic at Great New York Show

Essentiality and Usefulness of the Passenger Car Emphasized Amid Scenes of Beauty and Patriotism—Hundreds of Accessories Shown

THE National Automobile Show at the Grand Central Palace, in New York, revealed the fact that the developments of the year as incorporated in the new models do not show any particular or definite trend as an outstanding feature, but individual cases of new departures in both chassis and body design.

The exhibition and those incident to it at the Salon in the Astor and various show rooms about the city was of a magnitude and significance befitting the progress of the industry, which has attained the highest point of prosperity and activity during the past year with approximately 5,000,000 car users.

Being the first National Motor Car Show ever held while the country was at war, members of the industry, dis-

tributors and dealers were watchful to detect any significant tendencies that might foreshadow conditions in the trade for the coming season. The results of the show, however, proved a vindication of the opinions expressed by the extreme optimists before it opened and the consensus of opinion among leaders of the trade was that the coming season was a most successful one and that the need of the motor car was so great that even war time conditions would not restrict the demand for them.

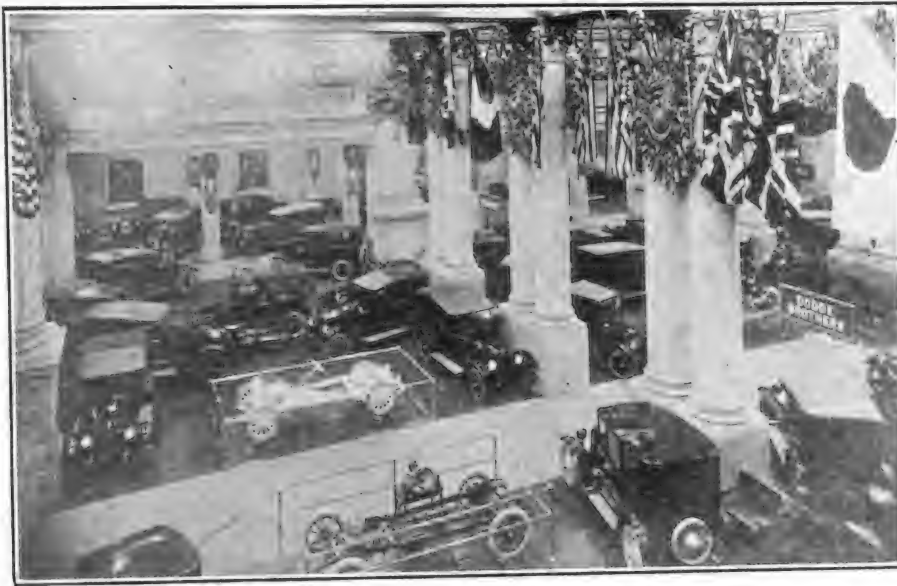
Car Utility Emphasized.

There were few exhibits that harkened of the day when the motor car was looked upon as a pleasure vehicle, the prevailing designs strongly indicating the utility of the motor car and its serviceability in transporting passengers. In

the Grand Central Palace there were none of the freakish or extreme types of bodies, although this conspicuous feature of the show did not indicate any lack of progress in the art of coach making, as was exemplified by the latest bodies, many refinements being noticeable, in line, fittings and finish.

While, as stated, there is evidence in every exhibit almost of the tendency to concentrate on utility principles in design, individuality is manifested as much as ever, reflecting the individual tendencies of the designers and makers, and this is more significant of progress than ever before, as each succeeding year finds design and development so advanced that improvement is attained only through extraordinary effort.

An increase in the number of the wire



Exhibits on the Main Floor Looking Toward 46th Street.

wheels used and the presentation of several models equipped with steel disc wheels was the most conspicuous change noted in appearance. The steel disc wheel gained its popularity in the war zone before being introduced as a practical economical wheel for passenger cars. An Anderson De Luxe, McFarlan sport model, Paige touring, Oldsmobile touring cars were exhibited with steel wheels, which lent a military tinge to the exhibits in which they were included.

Around the New Overland.

New cars or models usually attract the most interest during show time, and this fact was demonstrated this year again, and particularly in the case of the new Overland car, which is looked upon as the nearest competitor of the Ford, and the new air cooled car being manufactured by Arthur Holmes and bearing his name. The new Overland creation might be termed radical in the nature of its design, as it has a unique type of spring suspension. The frame is made of a section of channel steel, the two side members of which drop slightly in

front and rear and come together at the ends. Semi-cantilever type of springs are shackled onto the part where the ends meet and extend back to the spring saddles on the axles. A similar system of suspension is used on rear, and while the wheelbase of the car is but 100 inches, it is claimed that the same riding qualities are obtained as could be secured by the use of a much longer wheelbase. It is stated that the Willys-Overland engineers have been working on the new model for several years and that it will be on the market in quantities. It is understood that it will sell

at less than \$500, but no official statement has been made by the company regarding the price as yet. In appearance it differs somewhat from other Overland types owing to the distinctive appearance due to the suspension, but the familiar Overland lines are recognizable on the radiator hood and cowl. The body is of streamline design with removable upholstery.

The power plant is a $3\frac{1}{2} \times 4$ four-cylinder engine in unit, with a three-speed sliding gear transmission and conventional clutch. The engine reaches the peak of its power curve at 2000 revolutions per minute, at which speed it is said to develop 52 per cent. more power than the Ford engine, which reaches the peak of its power curve at 1300 revolutions per minute.

Equipment includes a complete electric system and Auto-Lite starting and lighting outfit and U. S. L., Gould or Willard battery equipment. The generator is mounted on the right side of the



Overland Booth, Showing the Surprise Car of 1918.

engine and is driven directly from the timing set and the starting motor is on the left side of the engine and engages the flywheel through a Bendix gear.

The Holmes car held a place in the limelight during the week through virtue of the fact that it has an air cooled engine and made its debut in New York as the second car of this type of power plant in the field. It is manufactured by the Holmes Automobile Co., Canton, O., which was organized by Arthur Holmes, formerly vice president and chief engineer of the Franklin Automobile Co. of Syracuse, N. Y., which has been the sole manufacturer of an air cooled type of car in the field for many years. The Holmes company has a factory with 175,000 feet of floor space and plans to manufacture 4000 of the cars for the coming season.

The Holmes company did not have space at the show, but exhibited its new line at its salesrooms at 52 Vanderbilt avenue, near the Grand Central Palace.

Interesting New Power Plants.

In power plants interest centred about the American sleeve valve engine, as it



Accessories Shown on the Third Floor of Grand Central Palace.

presented the newest feature of a radical character in engine design. It differs from the well known Knight type of engine in that the sleeves, instead of rising and falling for intake and exhaust through the ports, revolve around the cylinder axis inside the cylinder and around the pistons. They are driven by spiral gears on a shaft engaged with a crankshaft gear and produce practically no vibration even when the engine is driven at high speed. Another exclusive feature of this new type of engine is that it draws cool air through the crank case, where it becomes heated and mixed with oily vapor, becoming part of the gas mixture in the carburetor.

Car Debuts at the Salon.

The Automobile Salon at the Hotel Astor, as in years past, was characterized by the luxurious body styles shown. While luxury in finish was evident on every hand, there were less freakish or extreme types shown than in previous Salons. The most striking body shown was an individual creation on a special



De Luxe Cars at the 1918 Automobile Salon in the Hotel Astor.

by improving the carburetion. Most of the third floor and

all of the fourth floor of the Grand Central Palace were given over to the accessory exhibitors, there being 260 different companies displaying products and many of these showed several lines, some having upwards of 50 or 60 pieces of equipment. There was almost as much interest shown in the accessory exhibits as in the new cars, and the two floors were well filled with people day and night.

No more striking evidence of the utility of the motor car and the position of value it has taken with the American farmer in increasing his efficiency and

production, was presented than the number of tractor wheels on display which can be used in transforming the passenger car or truck into a tractor for farm work.

In the following paragraphs will be found condensed information for the motorist regarding features and principal changes of cars included in the show exhibits and 1918 announcements:

PIERCE-ARROW.

There are no less than 135 improvements on the new Pierce-Arrow models. They include such details as an enlarged braking area, a new universal joint, an added grease cup on the top half of the rear spring seat, a change in the lower throttle lever for foot accelerator to give a slower first opening, a new brace for the columns on runabouts, a longer water jacket, thermostat water control, an improved radiator, an oil gauge registering 100 pounds, a new hood catch, a metal rest for hood when raised, a new rear tire carrier ring type, new straight side tires, a new clock, new plate glass window in rear of cape top and a projecting instrument plate on the dash.



White Exhibit in a Corner of the Salon.

four-passenger Murray car, which was made to order for a prominent motorist. The body is of aluminum, with sharp angular lines throughout, even the mudguards being carried over the wheels semi-hexagonal in shape. Its appearance was greatly enhanced by the high polish on the metal body and the use of steel disc wheels. A Fageol with a Hall-Scott aviation engine, at \$13,000, was the highest priced car in the Salon. A new car, the Mercury, made by the Mercury Cars, Inc., Hollis, L. I., made its debut at the Astor.

Among the Accessory Exhibits.

The exhibit of accessories was more elaborate than ever before and brought out many new devices to effect economy and convenience in the operation of the car, to meet a demand created by the war situation. Under this head were included thermostatic controls of radiator shutters, heating devices for preheating the gasoline mixture, and other equipment tending to increase the efficiency of the engine by either governing the temperature of the cooling circulation or



Fourth Floor of National Show, Accessories and Parts Exhibits.

PREMIER.

An extended victoria top, spot light, Motometer and windshield cleaner come as additional equipment on new Premier models.

VELIE.

There is an entirely new line of Velie bodies and the tops are fitted with curtains that open with the doors.

WESTCOTT.

A "self-acting" top is fitted on all new Westcott models and wick-fed oil cup lubrication throughout has replaced the grease cups.

CADILLAC.

The model 57 Cadillac eight-cylinder engine has detachable heads, which greatly facilitate overhauling and repairing. Tilting headlight reflectors and a radiator condenser are other improvements in the new models.

JACKSON.

On the new Jackson "Flyer" model the new equipment includes a motometer and tonneau light.

HOLLIER.

The model M 206 Hollier has a new Continental motor, $3\frac{3}{4} \times 4\frac{1}{2}$, a special racing type of body, which has very attractive lines. The car has improved riding qualities, due to new cantilever spring construction.

YALE.

A number of very important improvements are noted in the new Yale Eight, including a Jacox steering gear, Colonial motor, Borg & Beck clutch, Detroit gear and transmission, Radometer, combination dash and trouble light and improved cushions.

ALLEN.

The bodies of the Allen car for 1918 are of a more pronounced streamline type and have a slanting windshield. The rear seat is four inches wider and is upholstered with double deck cushion springs. Engine innovations on the Allen are as follows: Heavier crankshaft, lighter reciprocating parts, extra long connecting rods, starting and lighting, Auto-Lite two-unit system, Connecticut manual ignition, Perfex honeycomb radiator, Borg & Beck single dry disc clutch, increased gear ratio, Hotchkiss drive, hollow propeller shaft with two universal joints, full crowned fenders and mud splash guard below radiator, all electric control on steering column.

AUBURN.

Two chassis models are exhibited, with a complete line of body types. The 6-44 has a Continental engine and the 6-39 a Teetor-Hartley engine.

BELL.

A Continental motor is being used in the Bell chassis this year instead of a Lycoming, as used last year, and the finish of the car has been greatly improved through the use of Spanish leather trimmings in the upholstery.

DISPATCH.

A motor driven tire pump is included in the regular equipment on the 1918 Dispatch cars.

GHEENT.

All the new Ghent models this year are fitted with full equipment and have

also the most up-to-date convenience to increase the riding comfort of the passengers.

HARVARD.

The gas tank on the new Harvard has been shifted to the rear of the chassis and the Stewart vacuum system of fuel feed installed.

HATFIELD.

Hatfield equipment for 1918 includes a spare tire and a bumper. The war tax is included in the price.

LAUREL.

The Laurel engine for 1918 has 16 valves and an M. & S. differential is employed.

AUSTIN.

An Austin two-speed axle and Austin double cantilever springs are Austin features for 1918.

CASE.

Case features for the new models are: Kellogg tire pump, in unit with transmission and running in oil; bulls eye lamps in back of each front seat of touring and roadster; wheelbase 125 inches, an increase of five inches over previous models; Marshall cushion springs, for backs and cushions; folding, slanting, rain vision, ventilating windshield.

DORRIS.

Dorris equipment on the 1918 models will be most complete: One-man top and dust cover, rain vision windshield, ventilating top and bottom; 60-mile Warner speedometer, tire carrier, extra demountable rim, electric headlights with dimmer and small four-inch individual anchor lights, Boyce motometer, electric tail light with license carrier, electric horn, electric inspection light, robe rail, foot rest, complete set of tools, jack and tire repair outfit.

KISSEL.

A new exclusive Kissel feature is the all-year top sedan and staggered door sedan which can be entirely removed or all windows lowered or raised full length.

KLINE.

The 1918 Kline Kar has a new straight front and radiator instead of the V type formerly used and a higher hood, which has less slope from cowl. The car is hung one inch lower, but has the same road clearance. There is also the new Kline sport model with low sides to body, long and rakish with longer rear springs. Additional equipment this year includes motometer and spot light.

LOCOMOBILE.

Outstanding new features of the new Locomobile are found in the tandem dual ignition system, Berling magneto and Lanchester damper.

NASH.

There are three new Nash models, all of which will have as additional equipment a Stewart Warner speedometer, clock, slanting windshield, one-man top and extra rim and tire carrier.

NATIONAL.

The 12-cylinder National models will have the airplane type of engine.

MAIBOHM.

Besides the Maibohm model B, which is an entirely new creation for 1918, a detachable winter top is fitted on the

model A, making their roadster. The model A coupe is also new.

MAXWELL.

Maxwell sedans and coupes for 1918 are equipped with wire wheels, which are also optional on the town cars.

METZ.

Westinghouse starting and lighting system and Atwater Kent ignition is standard equipment on the new Metz models. Improved body finish and slanting windshield are other new features.

PILGRIM.

Pilgrim model 61 is fully equipped, having a motometer, motor driven horn, gasoline gauge in tank at rear, one-man top, rain vision, ventilating windshield, extra tire carrier and rim.

REGAL.

The 1918 Regal is equipped with Auto-Lite starting and lighting system and Atwater Kent ignition.

SENECA.

A number of changes are found in the new Seneca models, including, heavier axle and bearing equipment, heavier front spring equipment and other small improvements in mechanical construction. The gear ratio on high is 4.500 to 1. A new style of upholstery has also been adopted.

STUTZ.

All 1918 Stutz cars are equipped with the 16-valve motor and a number of slight changes are noted in the body designs. New style of tire carrier has been adopted and instrument boards are installed on all models. Tire equipment is $32 \times 4\frac{1}{2}$ all around on all models.

WOLVERINE.

Wolverine cars are primarily custom made. The bodies are built of aluminum with individual fenders of either aluminum or patent leather.

HAL-TWELVE.

An entire new line of body styles is presented in the 1918 Hal-Twelve models, which have as features a new fivepiece ventilating hood, Lustig spring cover, new radiator, fenders and splash aprons.

DIXIE.

New body features on the Dixie line are the most important changes in the 1918 models. A new sedan body is furnished with the left hand door forward for the convenience of the driver in entering or leaving the car without disturbing passengers in the rear compartment. The driver's seat is made wider and more commodious and the right hand forward seat is made to fold up against the side of the body.

COLE EIGHT.

Cole Eight, models 870, 871, 872, are equipped with the new Aerotype bodies.

COLUMBIA SIX.

All models of the Columbia Six are being equipped with thermostat attachment, which controls radiator shutters. This device maintains a proper temperature in the cooling system and greatly increases the efficiency of the motor. Plate glass lights with silver plated moulding are used on the sport model.

Service List for Orphan Car Repair Parts

Numbers Appended to Names of Cars Listed Correspond With Those
Against the Dealers and Makers Enumerated in the Subjoined Columns

- Acme—8, 150.
Adams Truck—114.
Aerocar—8, 9, 10, 11, 150, 171.
Alco—1, 2, 28, 43, 54, 80, 99, 150, 152.
Alden Sampson—150, 171, 172.
Allen Kingston—8, 9, 10, 80, 124, 130, 150.
Allis-Chalmers—9, 10, 150.
Alma—58.
American Mora—161.
American Underslung—8, 8, 9, 10, 11, 32, 80, 114.
American Truck—11, 143.
Alpena—9, 10, 80, 150.
Alter—3, 150.
American Voiturette—171, 172.
Ames—8, 9, 10, 80, 166.
Amplex—78, 80, 124, 143, 150.
Anchor—4, 84.
Anhut—9, 150.
Ardley—7.
Argo—150.
Atlantic—9, 10, 150.
Atlas—8, 9, 10, 80, 124, 150.
Autocar (passenger)—15, 150.
Autocar Defender—124.
- Babcock—9, 10, 20, 80, 150.
Badger—8, 9, 10, 150, 162.
Barnes—150.
Benham—80, 150.
Bens—80.
Bergdol—8, 9, 10, 14, 26, 80, 11, 113, 124, 130, 143, 150, 154.
Berkshire—8, 9, 10, 23, 25, 150.
Berliet—2.
Bessmer—54, 150.
Bimel-Elco—3, 27.
Black Crow—53.
Blomstrom—150.
Borland—150.
Briggs-Detroit—28, 29, 11, 113, 130, 150.
Brintell—9, 10, 150.
Broc—150.
Brodeser—150.
Brown Commercial—11, 82.
Brownie Kar—93.
Brush—13, 58, 80, 130, 134, 150, 169, 172.
Buffalo Electric—150.
Bush (old)—185.
- California—150.
Cameron (air cooled)—33.
Carhartt—8, 9, 10, 11, 80, 150.
Carnation—8, 9, 10, 11, 34, 104, 150.
Carter Car—13, 124, 150, 169.
Carriage—150.
Cavoc—150.
Century—150.
Chadwick—38.
Chief—41.
Cino—80, 150.
Clark—8, 9, 10, 42, 43, 125, 150.
Clark Carter—54, 55, 68, 150.
Cleveland—76, 143.
Coates-Goshen—45, 80, 132.
Colburn—48, 64, 150.
Colby—9, 10, 87, 150, 166.
Coleman—58.
Colley—150.
Columbia (old)—13, 47, 143, 150, 171, 172.
Columbus (gas)—137.
Columbus (electric)—137.
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DIRECTIONS: To Find Where to Obtain the Part Desired, Look for the Name of the Car in the Car List and Refer to This List of Firms by Number.

- 1 Alco Service Co., 158-162 N. 22nd St., Philadelphia, Pa.
- 2 American Locomotive Co., Providence, R. I.
- 3 American Motor Parts Co., 430 N. Capital Ave., Indianapolis, Ind.
- 4 Anchor Buggy Co., Cincinnati, O.
- 5 Anchor Motor Car Co., St. Louis, Mo.
- 6 Arnold, Adam E., 212 S. 11th St., Reading, Pa.
- 7 Ardsley Motor Car Co., Yonkers, N. Y.
- 8 Auto Gear and Parts Co., 291-93 Marietta St., Atlanta, Ga.
- 9 Auto Gear and Parts Co., 1461 S. Michigan Ave., Chicago, Ill.
- 10 Auto Gear Co., 844 8th Ave., New York City.
- 11 Auto Parts Co., 737-739 W. Jackson Boulevard, Chicago, Ill.
- 12 Auto Parts Co., Elkhart, Ind.
- 13 Auto Parts Co., Omaha, Neb.
- 14 Auto Parts Co., St. Louis, Mo.
- 15 Autocar Co., Ardmore, Pa.
- 16 Auto Parts and Repair Co., Springfield, Mass.
- 17 Automobile Mechanics Corp., 221 W. 53d St., New York.
- 18 Auto Salvage Co., 1701-05 Main St., Kansas City, Mo.
- 19 Babel, L., 371 East 29th St., Chicago, Ill.
- 20 Babcock Mfrs. Supply Co., Watertown, N. Y.
- 21 Barley Motor Car Co., Streator, Ill.
- 22 Bauer Machine Works, Kansas City, Mo.
- 23 Berkshire Motor Co., Pittsfield, Mass.
- 24 Bever Mfg. Co., First and Oklahoma Aves., Milwaukee, Wis.
- 25 Belcher Engineering Co., 43 Ames St., Cambridge, Mass.
- 26 Bergdoll Co., Louis J., Philadelphia, Pa.
- 27 Bimel Automobile Co., Indianapolis, Ind.
- 28 Boulevard Motor Co., Waverly St. & Putnam Ave., Cambridge, Mass.
- 29 Briggs-Detroit Co., Hancock and Berks Sts., Philadelphia, Pa.
- 30 Brown-Lipe Gear Co., Syracuse, N. Y.
- 31 Buda Co., Harvey, Ill.
- 32 Burt Motor Car Co., W. J. Pico and Hope Sts., Los Angeles, Cal.
- 33 Cameron Mfg. Co., New Haven, Conn.
- 34 Car-Nation Motor Car Co., Detroit, Mich.
- 35 Case, T. M. Co., J. I., Racine, Wis.
- 36 Central Auto Supply Co., Philadelphia, Pa.
- 37 Chadwick, De Lamater Corp., 159 W. 24th St., New York, N. Y.
- 38 Chadwick Engineering Works, Pottstown, Pa.
- 39 Chevrolet Motor Co., Flint, Mich.
- 40 Chicago Coach and Carriage Co., Chicago, Ill.
- 41 Chief Motor Co., Detroit, Mich.
- 42 Clark Auto Co., Atlanta, Ga.
- 43 Clark Motor Car Co., Shelbyville, Ind.
- 44 Clyde Cars Co., Clyde, O.
- 45 Coates-Goshen Auto Co., Goshen, N. Y.
- 46 Colburn Automobile Co., Denver, Col.
- 47 Columbia Auto Repair Co., Hartford, Conn.
- 48 Columbus Buggy Parts Co., 400 Dublin Ave., Columbus, O.
- 49 Colter, A. W., Toledo, O.
- 50 Connecticut Auto Parts Co., 1070 Main St., Hartford, Conn.
- 51 Corbin Motor Vehicle Corp., New Britain, Conn.
- 52 Crescent-Ohio Service and Repair Co., St. Bernard, O.
- 53 Crow Elkhart Motor Co., Elkhart, Ind.
- 54 Cutting Co., Robert M., 2635-2645 S. Wabash Ave., Chicago, Ill.
- 55 Cutting Motor Car Co., Waterloo, Ia.
- 56 Croxton Motor Co., Washington, Pa.
- 57 Dauch Mfg. Co., Sandusky, O.
- 58 Dayton Auto Parts Co., 351 W. 52nd St., New York, N. Y.
- 59 DeKalb Wagon Co., DeKalb, Ill.
- 60 De Tamble Motors Co., 430-432 N. Capitol Ave., Anderson, Ind.
- 61 Detroit-Wyandotte Motor Truck Co., Wyandotte, Mich.
- 62 Drenco Machine and Garage Co., 527 Fifth Ave., New York, N. Y.
- 63 Driggs-Seabury Ordnance Co., Sharon, Pa.
- 64 E. & D. Garage, 12 E. Eighth Ave., Denver, Col.
- 65 Elkhart Carriage and Motor Car Co., Elkhart, Ind.
- 66 Elyria Belting and Machinery Co., Elyria, O.
- 67 Enger Motor Car Co., Indianapolis, Ind.
- 68 Erbes, L. C., 2654 W. University Ave., St. Paul, Minn.
- 69 Erickson & Stalnaker, Denver, Col.
- 70 Ewing, L. E., Cleveland, O.
- 71 Flier & Stowell, Milwaukee, Wis.
- 72 Florence Motor Rep. Co., 250 W. 54th St., New York, N. Y.
- 73 Frank, Paul A., 2349 Michigan Ave., Chicago, Ill.
- 74 Gaeth Motor Car Co., 2103 Lorain Ave., Cleveland, O.
- 75 Gale Auto Accessories Co., 423 Grand River Ave., Detroit, Mich.
- 76 Garford Motor Truck Co., Lima, O.
- 77 General Auto Repair Co., 908 Race St., Cincinnati, O.
- 78 Gillette Motors Co., Mishawaka, Ind.
- 79 Goldberg, H., 1420 S. Eighth St., Philadelphia, Pa.
- 80 Gorey & Co., J. C., 354 W. 50th St., New York, N. Y.
- 81 Gramm Motor Truck Co., Lima, O.
- 82 Great Western Automobile Co., Kalamazoo, Mich.
- 83 Green Engineering Co., Dayton, O.
- 84 Gustin Auto Co., 18 E. Mitchell Ave., Cincinnati, O.
- 85 Haas Electric and Mfg. Co., R., 305-307 E. Monroe St., Springfield, Ill.
- 86 Haberer & Co., Cincinnati, O.
- 87 Harper, E. V., Mason City, Ia.
- 88 Harris Bros. Co., Chicago, Ill.
- 89 Hartford Motor Car Co., Hartford, Conn.
- 90 Hassler Motor Car Co., Indianapolis, Ind.
- 91 Henderson Motor Car Co., Detroit, Mich.
- 92 Herreshoff Motor Co., Indianapolis, Ind.
- 93 Hinsdale Electrical Supply Co., Hinsdale, Ill.
- 94 Holly Motor Co., Mt. Holly, N. J.
- 95 Holmes Garage, Danville, Ill.
- 96 Huebotter, H. A., Davenport, Ia.
- 97 Huron Motor Car Co., Dearborn, Mich.
- 98 Imperial Automobile Co., Detroit, Mich.
- 99 International Motor Co., West End Ave. and 64th St., New York.
- 100 Jackson Automobile Co., Jackson, Mich.
- 101 Jahns, W. H., 908-12 W. Pico St., Los Angeles, Cal.
- 102 Johnson Service Co., Milwaukee, Wis.
- 103 Kany, A. S., 251 Boyer St., Dayton, O.
- 104 K. C. Auto Parts Co., 1827 McGee St., Kansas City, Mo.
- 105 Keeton Motor Car Co., Detroit, Mich.
- 106 Kelsey Motor Co., Hartford, Conn.
- 107 Keith Bros., Elkhart, Ind.
- 108 Knox Motors Associates, Springfield, Mass.
- 109 Krit Motor Car Co., Detroit, Mich.
- 110 Lansden Co., Inc., Brooklyn, N. Y.
- 111 Levene Motor Co., 2200-18 Diamond St., Philadelphia, Pa.
- 112 Levengood, A. J., 153 N. Fourth St., Reading, Pa.
- 113 Lion Motor Parts Co., Philadelphia, Pa.
- 114 Longaker Co., V. A., 448-450 N. Capitol Ave., Indianapolis, Ind.
- 115 Loper, G. E., Port Jefferson, N. Y.
- 116 Lozier Motor Co., Detroit, Mich.
- 117 L. P. C. Motor Co., Indianapolis, Ind.
- 118 Marathon Service Co., Nashville, Tenn.
- 120 Marion Motor Service Co., Indianapolis, Ind.
- 121 Mason Motor Car Co., Detroit, Mich.
- 122 Mathewson Co., Frank E., Wilkes-Barre, Pa.
- 123 Maxwell Motor Sales Corp., 675 Golden Gate Ave., San Francisco, Cal.
- 124 Maxwell Bros., 3921 Olive St., St. Louis, Mo.
- 125 Mercury Mfg. Co., Chicago, Ill.
- 126 Meteor Motor Car Co., Piqua, O.
- 127 Meteor Motor Car Co., Shelbyville, Ind.
- 128 Metz Co., Waltham, Mass.
- 129 Michigan Motor Car Parts Co., Detroit, Mich.
- 130 Midland Motor Co., 2200-2218 Diamond St., Philadelphia, Pa.
- 131 Mier Carriage and Buggy Co., Ligonier, Ind.
- 132 Miller Car Co., Goshen, N. Y.
- 133 Moffitt's Sons, Binghamton, N. Y.
- 134 Moore & Co., John, 2204 Broadway, New York, N. Y.
- 135 Motor Corp., rear 1309 Race St., Philadelphia, Pa.
- 136 Muskegon Automobile Co., Muskegon, Mich.
- 137 New Columbus Buggy Co., Columbus, O.
- 138 New Departure Mfg., Bristol, Conn.
- 139 New Jersey Machinery Co., Newark, N. J.
- 140 Northway Auto Parts & Sales Co., 223 Kearney St., Cincinnati, O.
- 141 Oldsmobile Co., Chicago, Ill.
- 142 Oliver Motor Truck, Detroit, Mich.
- 143 Pacific Motor Car Exchange Co., 221 W. 53d St., New York City.
- 144 Pathfinder Co., Indianapolis, Ind.
- 145 Petrie & Morganthall, Greencastle, Pa.
- 146 Philadelphia Machine Works, 61-71 Laurel St., Philadelphia, Pa.
- 147 Pierce Motor Co., Racine, Wis.
- 148 Pungs-Finch Auto and Gas Engine Co., Detroit, Mich.
- 149 Pullman Motor Car Co., York, Pa.
- 150 Puritan Machine Co., Detroit, Mich.
- 151 Quincey Engine Co., Chambersburg, Pa.
- 152 Rand & Chandler, 526 S. Flower St., Los Angeles, Cal.
- 153 Randolph Motor Truck Co., Flint, Mich.
- 154 R-C-H Corp., Detroit, Mich.
- 155 Red Arrow Auto Co., Orange, Mass.
- 156 Republic Motor Car Co., Youngstown, O.
- 157 Riverside Machinery Depot, Detroit, Mich.
- 158 Ricketts Auto Works, Detroit, Mich.

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| 159 Rosenfield, J., 521 Sixth St., Boston, Mass. | Atlanta, Ga. | 180 Thomas Motor Car Co., E. R., Buffalo, N. Y. |
| 160 Royal Tourist Co., 72nd St. and St. Claire Ave., Cleveland, O. | 171 Standard Motor Parts Co., Detroit, Mich. | 181 Times Square Auto Supply Co., 56th St. and Broadway, New York. |
| 161 St. Louis Car Co., St. Louis, Mo. | 172 Standard Motor Parts Co., New Castle, Ind. | 182 Topefers Sons, Milwaukee, Wis. |
| 162 Schultz & Harder, Columbus, Wis. | 173 Stehle, R. W., 1519 W. Dauphin St., Philadelphia, Pa. | 183 Travellers Automobile Co., Evansville, Ind. |
| 163 Sibley Motor Car Co., Detroit, Mich. | 174 Stevens-Duryea Co., Chicago, Ill. | 184 Trumbull Motor Car Co., 2200-2218 Diamond St., Philadelphia, Pa. |
| 164 Slinger Motor Car Co., West End Ave. and 64th St., New York, N. Y. | 175 Stevens-Duryea Co., Chicopee Falls, Mass. | 185 Victor Motor Car Co., York, Pa. |
| 165 Smith Automobile Co., Topeka, Kan. | 176 Stevens-Duryea Co., 72 12th St., San Francisco, Cal. | 186 Walker & Barkman Mfg. Co., Hartford, Conn. |
| 166 Smith Co., A. O., P. O. Box 87, Milwaukee, Wis. | 177 Stevens-Duryea Service, Inc., 22 W. 61st St., New York, N. Y. | 187 Walk Hill Garage, Mattapan, Mass. |
| 167 Smith, G. B., 328 Halsey St., Newark, N. J. | 178 Studebaker Corp., Detroit, Mich. | 189 Waukesha Motor Co., Waukesha, Wis. |
| 168 Sommer Motor Co., Detroit, Mich. | 179 Stutz Motor Car Co., 2450 Michigan Ave., Chicago, Ill. | 190 Willys-Overland Co., Toledo, O. |
| 169 Southern Welding Co., Waco, Tex. | | 191 Zimmerman Mfg. Co., Auburn, Ind. |
| 170 Southern Auto and Equipment Co., | | |

Special Parts Service Offer

This list may not be wholly complete, but it is to be borne in mind that many parts of a car may be replaced with parts of other cars traceable here for used cars and various purposes through this information.

Pistons, piston rings, connecting rods and valves, as well as carburetor parts, may be interchangeable with standard parts of other machines. Clutch parts, flywheels in some cases and transmission gears are often interchangeable.

Shafts for wheels, as well as propellor shafts, can usually be made in the local machine shops at a cost about equal with that of a supply part from the manufacturer.

Pinion and master drive gears of many cars are the same and the owner or dealer can usually locate a live car with practically the same equipment.

Differentials can be replaced by differentials from other cars with perhaps a slight change in the bearings.

When writing manufacturers of Orphan car parts it is always best to give full details, name, type and number of car, and where possible a sketch showing sizes, etc., of the part desired, for if this is done the manufacturer may furnish a part from another car that can be used to equal advantage.

If unable to locate part desired, write the Automobile Journal Publishing Co., giving all information, particularly sizes and sketch, and the Automobile Journal will try to locate such part.

Owing to rapid changes due to war conditions this list is subject to additions and corrections.

C. F. KETTERING HEADS SOCIETY OF AUTOMOTIVE ENGINEERS.

Charles F. Kettering, vice president of the Dayton Engineering Laboratories Co., was elected president of the Society of Automotive Engineers at the winter meeting of the organization held in New York during the week of the National Automobile Show.

Mr. Kettering is one of the best known engineers in the industry, having been connected with the makers of Delco products for nine years, and had formerly been in charge of the engineering development work on electrical work with the National Cash Register Co. He is a graduate of Ohio State University.

The other new officers elected are: First vice president, David Beecroft; second vice president, C. C. Hinckley, president and general manager Hinckley Motors Corporation, representing motor car engineers; second vice president, George H. Houston, representing aviation engineering; second vice president, Fred Glover, Emerson-Brantingham Co., representing tractor engineering; second vice president, Henry R. Stuphen, vice president Submarine Boat Corporation, representing marine engineering; second vice president, H. R. Brate, representing stationary internal combustion engineering; secretary-general manager, Coker F. Clarkson; treasurer, Charles B. Whitelsey, vice president Hartford Rubber Works.

The councillors for the ensuing year are: B. B. Bachman, engineer Autocar Co., Ardmore, Pa.; H. L. Horning, en-

gineer Waukesha Motor Co., Waukesha, and chairman Automotive Section of the War Industries Board; C. W. McKinley, chief engineer, Willys-Overland Co.; George W. Dunham, past president; Russel Huff, past president. Councillors for 1919, Charles S. Crawford, chief engineer Premier Motor Corporation; Charles M. Manly, vice president and chief engineer, Curtiss Aeroplane Co.; J. V. Whitbeck, chief engineer, Chandler Motor Car Co.

SENATE REPORTS FAVORABLY ON GIRAGOSSIAN ENERGY BILL.

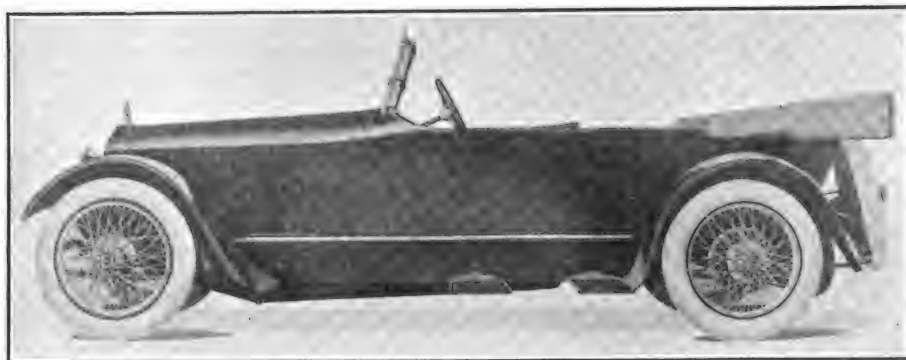
The Committee on Patents of the United States Senate has reported favorably a joint resolution authorizing the Secretary of the Interior to accept as trustee for the United States govern-

ment from Garabed T. K. Giragossian of Boston an assignment of right to utilize for the government the discovery which he claims to have made making possible the use of a form of free energy hitherto unused.

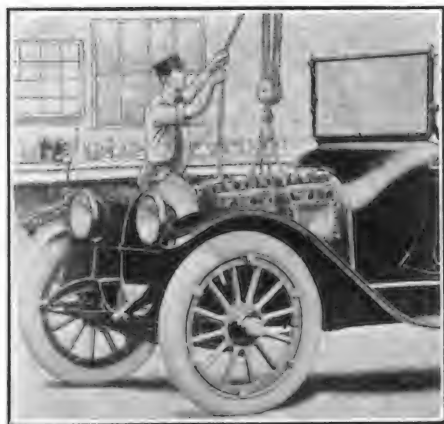
The resolution provides for the demonstration of the usefulness and of the practicability of the reported invention or discovery to a commission of five leading scientists.

GRAPHITE CELEBRATES XMAS.

The Christmas number of Dixon's Graphite carries the season's greetings cheerily. Liberty bonds and food conservation are emphasized strikingly, in addition to a number of business guidance tips of value, including ethics, export development and system.



Roamer D Four-Seventy-Five, Equipped with the New Duesenberg Motor, Exhibited at the New York Salon.



Overhauling *The* Automobile

THE REO CAR

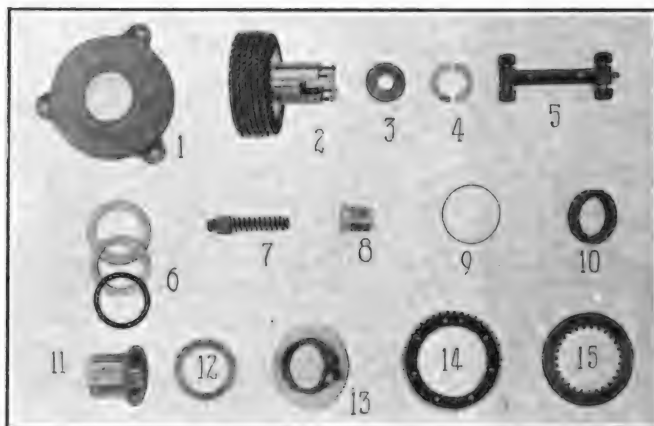
This is the 13th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 14th article of this series will appear in the Jan. 25th issue of the Automobile Journal.

SINCE the year 1915 the mechanical construction of the Reo car has remained practically unchanged. The engine, of the L head type, differs from the conventional L head type in that the exhaust valves only are located in the L, the intake valves being located in the head and actuated by push rods and rocker arms. Here again the construction differs from the conventional, for the intake valves are mounted in the valve caps or cages and are removable without disassembling the engine.

The clutch, of the multiple disc type, is mounted in the flywheel separate from the transmission, which is mounted on the frame amidships. The rear axle of the four-cylinder cars is of the semi-floating type. Any of the units may be removed for repairs without disturbing the other units, a feature that makes the overhauling of the car a comparatively simple matter.

Draining and removal of the radiator is the first step in the overhaul. This unit is bolted to the chassis from beneath and connected with the engine through flexible hose at the top and bottom. Upon removing the hose clamps and the retaining bolts, it may be lifted from the frame.

The fan is mounted on an eccentric which is retained by a clamping bolt to the front water jacket cover. The water jacket cover is fastened by six cap screws, which should be



Clutch Components: 1, Thrust Member; 2, Clutch Driven Gear and Universal Fork with Clutch Plates; 3, Dust Washer; 4, Universal Cover; 5, Drive Shaft for Clutch Transmission Universal; 6, Thrust Washers; 7, Clutch Spring and Bolt; 8, Driven Gear Bushing; 9, Disc Wire; 10, Driven Gear Bearing; 11, Relief Sleeve; 12, Thrust Bearing; 13, Relief Collar Retainer; 14, Faced Driving Disc; 15, Driven Disc.

removed, thus letting the fan with its cap be removed and giving access to the water jacket of the front cylinder block. A cover plate on the rear of the block and cover plates on the front and rear of the back cylinder blocks permit the insertion of cleaning wires for scraping off rust and deposits. The two cover plates between the blocks cannot be removed until one or both blocks have been removed from the crank case. The interior of the water jackets should be carefully cleaned and all deposits removed.

Removing the Manifold.

Four nuts fasten the water manifold to the cylinder blocks. These are next removed and after the tube leading to the intake manifold has been disconnected the manifold should be taken from the engine. The rocker arms are mounted on Y shaped castings, which are threaded and screwed into the cylinder blocks and prevented from turning by lock nuts. Loosen the lock nuts and swing the rocker arms to one side, leaving sufficient clearance for the removal of the intake valves and cages. Unless the Y castings, upon which the rocker arms are mounted, are broken or bent, these members need not be removed from the block. The rocker arms should be given a careful examination, and if loose upon the fulcrum bolt, either should be bushed or replaced with new.

The valve cages may be unscrewed with a pipe wrench or special tool, the latter method being the best. After the valve cages have been removed the springs may be compressed in a vise or between the jaws of clamps, the retaining pins pulled out and the valves removed. The valves are ground by placing the cage in a vise and turning the valve with a screw driver, using grinding compound in the usual way. After grinding, both the valve and cage should be thoroughly cleansed in kerosene oil. It is very essential



Top View of Engine Showing Rocker Arms Pushed to One Side and One Inlet Valve Cage Removed.

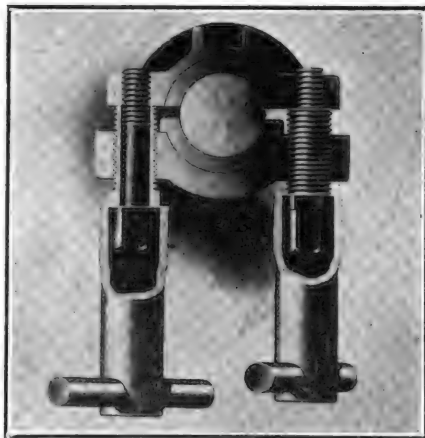
that the valve stems fit the cages perfectly, or dilution of the mixture by air leakage will result. Where the valve stems do not fit either the valves or cages should be replaced with new.

A clamping bolt fastens the muffler pipe line to the exhaust manifold. This is next loosened, the exhaust line disconnected and the hot air stove surrounding the exhaust manifold taken off. The exhaust manifold is retained by six cap screws, three in each block, and when these are taken out the manifold may be removed.

The valve caps over the exhaust valves are next removed. This may be done with a special tool or with a bar of iron, if the priming cups are first removed. Exhaust springs and valves are removed in the usual manner and the valves ground, care being taken to prevent the entrance of grinding paste into either the cylinders or the valve chambers. After grinding all traces of abrasive must be removed. The exhaust valves are carried in removable bushings, and, while the renewal of the bushings is not wholly necessary in cases of slight wear, there should not be excess play between the valve stems and the bushings. In renewing bushings they may be driven out from the inside by means of an iron bar and hammer.

Examining the Tappet Assembly.

All of the tappets and bushing assemblies are retained in the crank case by means of clamps or saddles. If the overhauling operation is to extend as far as the removal of the camshaft, the tappet assembly should be removed and examined at this point. Too much play between the tappet and guide results in oil leakage and expense. In case of wear of this kind the guide or tappet may be replaced with new at but small cost.



Sectional View of Main Bearing, Showing Method of Adjusting.

On the left side of the crank case are located two covers, covering inspection holes. These covers should now be removed and the connecting rods, crankshaft and camshaft examined.

Upon this examination

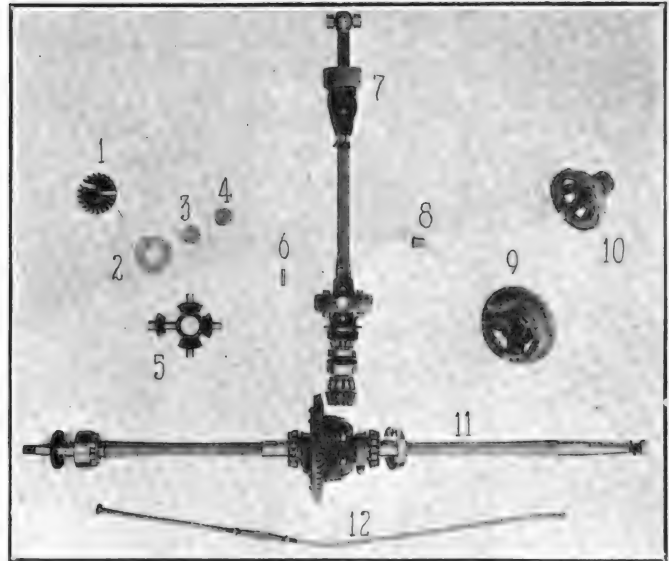
will depend the extent of the overhaul, for unless it is necessary to remove the pistons or connecting rods it will be unnecessary to remove the cylinder blocks. If, however, the cylinder blocks are to be removed at all they may be taken off at this time.

Remove the four nuts which fasten the intake manifold to the blocks and after having shut off the gasoline and drained the carburetor, remove the connections and take the carburetor and manifold from the engine. Below the carburetor manifold is located the water manifold. This unit, which is fastened to the two-cylinder blocks and the water pump, is next taken off and the cap screws removed that fasten the cylinder blocks to the crank case. The cylinder blocks may then be lifted from the crank case and examined.

The carbon may be removed from the explosion chambers and pistons at this time and the water jackets cleaned. A careful examination should be made of the cylinders for scores or grooves and repairs or replacements made as necessary.

With the cylinders removed the connecting rods and pistons may be removed if necessary for repairs or replacement. For ordinary connecting rod adjustment the removal of shims or the substitution of thinner shims is all that is necessary, unless the babbitt shows signs of extreme wear, when the whole rod should be removed and either replaced with new or returned to the factory for rebabbiting.

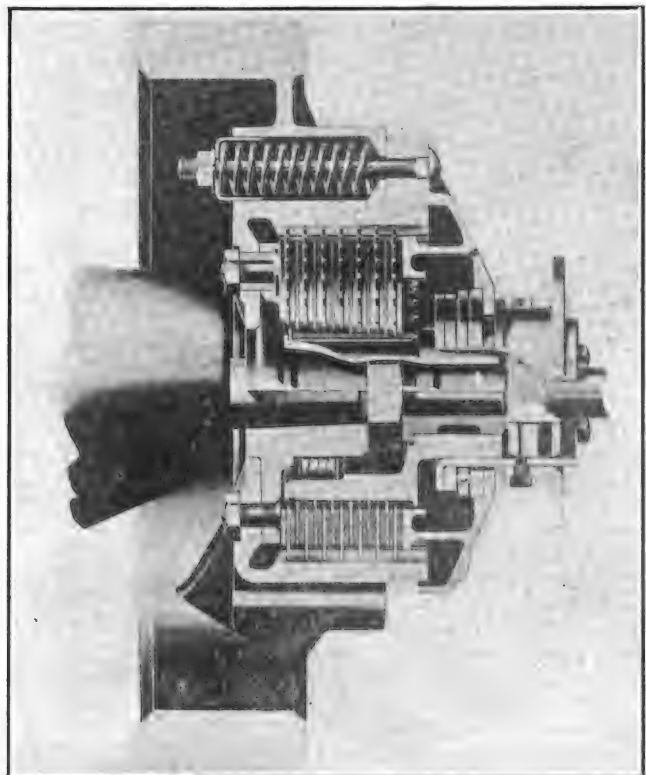
All of the main bearings are adjustable from the outside.



Rear Axle and Drive Shaft Parts: 1, Differential Gear; 2, Differential Thrust Washer; 3, 4, Axle Thrust Plates; 5, Differential Pinions and Spider; 6, Differential Gear Pin; 7, Driving or Propellor Shaft with Universals and Pinion Drive Gear Complete; 8, Universal Joint Bushing; 9, Differential Housing (Male); 10, Differential Housing (Female); 11, Rear Axle and Differential Assembly; 12, Truss Rod.

By referring to the accompanying illustration the construction of the main bearings is made clear. Instead of using shims for spacing the bearing caps, a patented sleeve and bolt arrangement is used. If there is play in any of the main bearings, loosen all of the adjusting screws and turn the inside or sleeve portions with the fingers until with the cap pressed against the journal they bring up against the upper bearing. Then turn the lower screw until the bearing cap is held solidly against the journal. Care should be observed not to make this adjustment too tight or excessive friction will result.

After having removed the two wires attached to the storage battery, the wiring attached to the engine and generator
(Continued on Page 45.)



Cross Sectional View of Clutch.

Against A Tax On Intelligence

FEW readers of the periodical press of America realize with sufficient clearness the fact that the hasty postal law passed by the last Congress on a zone rate basis places an enormous burden on the reading public. An advertisement on another page of this issue calls attention to how this postal legislation, included in the Revenue Bill, progressively increases the average carrying charge upon newspapers and periodicals from 50 to 900 per cent. It also calls attention to the restrictive and blasting effect that may be expected upon the publishing business in its function as a popular educator.

Never before in the history of this country has it ever crossed the mind of any citizen that it would be necessary to form organizations of readers in order to preserve their right to acquire information regarding their business and greatest interests in the columns of technical and trade papers. Yet this is a burden that falls upon readers now. The heavy increment of postage which the law imposes on the publisher rests there only temporarily. The operation of common sense soon develops that the money increase passes at once to the reader. If zone rates for subscriptions be not imposed, the periodical would be so handicapped that it would be compelled to go out of business or lower the value and volume of its contents. Take either horn of the dilemma and it is the reader who suffers.

Postal rates are transportation rates. It is true that the publisher prepays postage. Yet it requires only moderate business acumen to realize that postage is entered on the books as cost of distribution and enters into the price at which the newspaper or periodical is sold.

An increase by a flat rate could be handled more readily than the far reaching, high jumping costs under the zone rate plan. Every fair investigation of the zone rate has shown that it is too full of inequalities for application to the circulation of educational trade periodicals. But it is beside the mark, here, to examine at great length the most efficacious method that the government may find to levy a war tax on the readers or publishers of technical magazines. It is clearly evident now that the repeal of this law is imperative for the good of all.

Technical or business information such as the upstanding men of America need today is not found in every local print. The great value of the technical prints to merchants, doctors, lawyers, engineers, architects, machinists and other skilled persons is threatened with restriction, if not absolute deprivation, the minute they are made more costly or harder to get by mail.

The government would not have the young engineer, just out of college and on his first job on some big construction work in a remote corner of the West

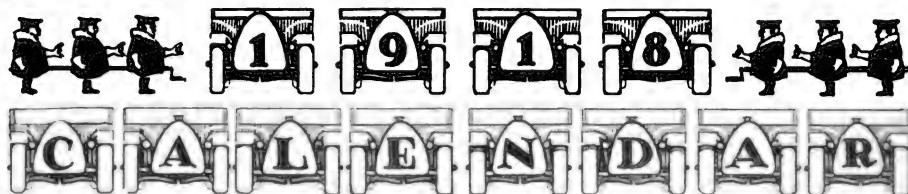
forced to pay a heavy tax if he is to receive regularly the great engineering magazines which keep him a student, interested and ambitious to know the best ways of overcoming the thousands of obstacles with which nature continually confronts the engineer. The government would not deny to the old engineer this record of the modern things which are gathered through national facilities and accurately published to help make big men and keep them big.

The government would not deny the machinist, crowded with his day's work in the great factory, the right and privilege in his home at night of learning through the magazines devoted to his field better, more efficient, more economical and less dangerous ways of doing his important day's work. The government would not have the motor mechanic depend on the brains of the single shop in which he works for new

ideas. It would not want him in time to become a single-cylinder man in a race with 12-cylinder competition. Yet he must risk this fate or pay this postage tax on intelligence in case he lives in a far-away zone from the one in which his favorite journal—the one he understands, the one that gives him the most of what he needs and does it in the clearest way—is published. The government would not deprive a man of his necessary information about his motor car, but such a terrific tax will mean there will be hundreds of thousands less readers of motor publications throughout the country.

The reader's tax would be regulated wholly by the distance his store or home happens to be from the publication office. Inequality of opportunity appears in the zone postage plan, which is too palpably a perversion of democratic institutions to last. Help repeal it.

There is opportunity to do something to correct this matter at once. Fill out and send the blank printed in this issue in the advertising section.



SHOWS.

Washington, D. C., carnival and open house week.....Jan. 11-18
 Providence, R. I., automobile showJan. 11-19
 Philadelphia, 17th annual automobile show.....Jan. 11-19
 Rochester, N. Y., 10th annual automobile show, Exposition Park..Jan. 14-19
 Milwaukee, Wis., automobile show....Jan. 18-24
 Detroit, Mich., annual show...Jan. 19-26
 Montreal, Can., automobile showJan. 19-26
 Cleveland, O., 17th annual automobile show.....Jan. 19-27
 Scranton, Pa., automobile show Jan. 21-26
 York, Pa., automobile show..Jan. 21-26
 Portland, Ore., automobile showJan. 21-26
 Mifflintown, Pa., automobile showJan. 22-26
 Allentown, Pa., automobile show.....Jan. 23-28
 Bridgeton, N. J., automobile showJan. 26-Feb. 2
 Chicago, Ill., national automobile showJan. 26-Feb. 2
 Chicago, Ill., salon, Congress hotel..Jan. 26-Feb. 2
 Columbus, O., automobile show.....Jan. 26-Feb. 2
 Harrisburg, Pa., automobile show....Jan. 26-Feb. 2
 Manchester, N. H., academy Jan. 28-Feb. 2
 Minneapolis, Minn., automobile showFeb. 2-9
 Binghamton, N. Y., show.....Feb. 5-9
 Kansas City, Mo., automobile showFeb. 9-16
 New York, Bronx dealers' automobile

show, Armory, 166th St.....Feb. 9-16
 St. Louis, Mo., automobile show Feb. 11-16
 Toledo, O., automobile show..Feb. 11-17
 Newark, N. J., automobile show.....Feb. 16-23
 San Francisco, second annual automobile show.....Feb. 16-24
 Waterbury, Conn., automobile show..Feb. 18-23
 Des Moines, Ia., automobile show.....Feb. 18-23
 Syracuse, N. Y., automobile show....Feb. 18-23
 Grand Rapids, Mich., automobile showFeb. 18-23
 Springfield, O., automobile show.....Feb. 18-23
 Pittsfield, Mass., automobile show....Feb. 18-23
 South Bethlehem, Pa., car and truck show.....Feb. 18-27
 Brooklyn, N. Y., motor vehicle show..Feb. 22-March 9
 Omaha, Neb., automobile show.....Feb. 23-March 2
 Bridgeport, Conn., automobile showFeb. 25-March 2
 Muskegon, Mich., automobile show..Feb. 25-March 2
 Boston, Mass., Boston Automobile Dealers' Association show.....March 2-9
 St. Joseph, Mo., automobile show....March 6-9
 Trenton, N. J., automobile show.....March 20-23
 Great Falls, Mont., automobile showMarch 16-20
 Stockton, Cal., automobile show.....April 9-13
 Chicago, Ill., accessory show for Ford accessories.....Sept. 23-28

Extensive Scope of the Automobile Industry

Friends of motor cars in this country know that motor manufacture and the motor truck makes an overwhelmingly big industry. The accompanying chart attempts to show graphically the enormous extent of the industry and what an interdependent business it is, how it helps to support dozens of other indus-

tries and provides a livelihood for nearly 1,000,000 employees and their families and is the sole dependence of 27,800 distributors and dealers.

tries and provides a livelihood for nearly 1,000,000 employees and their families and is the sole dependence of 27,800 distributors and dealers.

In the top row of circles in the chart, which was prepared by the National Automobile Chamber of Commerce, composed of manufacturers, are the raw materials, produced by the industries shown, which are drawn upon in the second row for the production of fabricated and partly manufactured materials used by makers of automobiles, automobile parts and accessories, amounting in all to a value of \$300,000,000

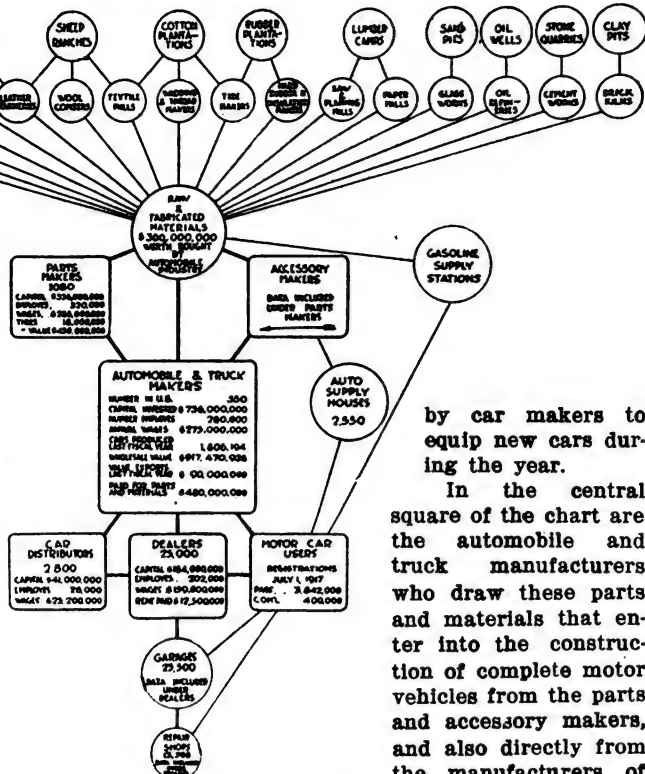


Chart Showing the Scope and Magnitude of the Motor Vehicle Industry and Its Relations with Other Dependent Industries.

by car makers to equip new cars during the year.

In the central square of the chart are the automobile and truck manufacturers who draw these parts and materials that enter into the construction of complete motor vehicles from the parts and accessory makers, and also directly from the manufacturers of raw and partly fabricated materials. A total of \$480,000,000 was paid for these supplies

for the year ending June last.

Contrary to the general supposition the motor industry is not located in one small territory, around Detroit, Chicago, Cleveland and Indianapolis. There are 550 makers of passenger cars and trucks with factories located in 32 different states of the Union. These plants represent an investment of \$736,000,000 and give employment to 280,000 workers.

Merchandising motor cars is an enormous business within itself, some 2800 distributors being engaged in it, with \$41,000,000 invested and an annual pay roll of \$25,200,000, which is paid to upwards of 28,000 employees. There are also about 25,000 retail dealers throughout the country, with an invested capital of \$184,000,000, who employ 202,000 salesmen and workers, with an annual pay roll of \$158,000,000. The garage and repair shops for the most part being conducted by either distributors or dealers, are included in the figures for those branches, but there are thousands of independent garages and repair shops not connected with car agencies of which no account has been made.

There were a total of 2,242,800 registered automobile owners in this country on July 1, 1917, of which number 400,000 were commercial car users. The business created by this vast army of owners does not cease with the purchase of a car, but they have to provide garage accommodations, have repairs made, buy tires, supplemental equipment, automobile clothing and other things from the 2550 supply houses, who in turn draw their stocks from the accessory makers, and also purchase large quantities of gasoline from the gasoline stations who get their supplies from the oil companies.

LONDON DEPARTMENT STORE SELLS GAS FOR MOTOR CARS.

Selfridge & Co., Ltd., the largest department store in London, in advertising its gas bags for coal-gas operated motor cars, offers to fill them free if they are purchased of the company. Since the use of gasoline is practically prohibited in England thousands of motorists and truck owners have equipped their cars with these large bags, which hold about 300 feet of illuminating gas.

MONTANA SHOW IN MARCH.

The Montana Automobile Distributors' Association, Great Falls, Mont., will hold its second annual automobile show in that city March 16-20. A. J. Breitenstein will again manage the show this year.

GOODYEAR BRANCH BURNS.

The Hartford, Conn., plant of the Goodyear Tire and Rubber Co. was destroyed by fire on Dec. 11 and automobile tires valued at \$300,000 were lost.

ALCOHOL AS FUEL IN AUSTRALIA

Scientific Council Reports Adversely to Motor Car Use Owing to Starting Difficulty

The Commonwealth Advisory Council of Science and Industry of Australia has published the report of its special committee on the question of alcohol fuel for engines. The committee reported that any ordinary gasoline engine may be run on alcohol except at the start and that the consumption of alcohol in such engines is about 50 per cent. greater than that of gasoline per horsepower developed. In specially designed alcohol engines the consumption of alcohol per horsepower is no greater than that of gasoline. The changes needed in the design of an engine to use alcohol are:

Increased compression from about 75 pounds to 180 pounds per square inch, preheating of fuel, air of mixture and increase in area of fuel supply pipes.

The carburetor must be preheated in

starting or an arrangement made for the use of a little gasoline. Exhaust gases preheat after the start. The committee decided to turn its attention to stationary engines rather than to motors for automobiles because of starting difficulties and the advantage as demonstrated that is found in slow speed engines with a long piston stroke. The successful alcohol in Germany was almost wholly of this type.

The following yields are reported in gallons of alcohol per ton of raw material used: Corn, 80-83; barley, 65-70; wheat, 80-85; potatoes, 15-24; beet, 12-16; apples, pears, apricots and peaches, 9-14; gum tree, 12; soft wood saw dust, 20; grapes, 18; molasses, 65-70.

A benzol-alcohol mixture was considered without recommendation.

Thermostatic Control a Feature of 1918 Cars

Thermostatic control characterizes a mechanical advance of 1918 machines over those of former years. The question of efficiency today is entirely dependent upon heat, and conservation of heat calls for accurate mechanical control in both the carbureting and radiating systems. Devices called thermostats are built in many of the present day radiating systems, which govern the water passing into the radiator or bypass it back to the cylinders. A recent innovation in design permits the cutting off of the radiator surface by means of a shutter like arrangement which is thermostatically operated.

Another device which makes for efficiency automatically opens and closes the carburetor needle valve as the heat decreases and increases.

Thermostatic metal, made by the General Electric Co. of Schenectady, is designed for operating all sorts of devices which depend upon change of temperatures. This new material consists of two sheets of metal having widely different coefficients of expansion, solidly welded together until they resemble one solid piece. As heat is applied one of the metal strips begins to expand, while the other having a low coefficient of expansion does not expand to such a degree. The result is a bending or warping of the strip, which continues in proportion to the amount of heat applied until the limit of expansion is reached or fusion commences. The G-E product may be used for temperatures as high as 500 degrees, and the distortion or bending effect is always the same whether the change is between zero and one degree or between 499 and 500 degrees.

Analysis of the accompanying chart (Fig. 1) shows the results of heat application from zero to 260 degrees Fahrenheit. The metal strip used in this experiment was practically straight at the normal temperature of 74 degrees, but at 260 degrees it bent to practically one inch out of line, and at zero, .4 out of line in the opposite direction. The piece used was four inches long and .03 of an inch thick. For radiator control work the temperature changes vary between normal

and 212 degrees and reference to the chart will show a distortion or bend of approximately three-quarters of an inch in the transition from average temperatures to that of boiling water.

Actual distortion, however, is not the only item to be taken into account. The strip must exert a certain force where it is used for opening and closing valves such as are found in the circulating system. That the G-E thermostatic metal has this property is shown by the second chart (Fig. 2). This chart was made upon a basis of experiments performed with various thicknesses of strips, four inches long by 5/16 wide and covering a temperature change of 100 degrees Fahrenheit. The force exerted by a metal strip, same as used in making chart Fig. 1, shows slightly over two ounces in the 100 degrees change.

The value of a metal that has a definite curve with varying temperatures should be great to the manufacturers of all kinds of electrical carburetor or radiating systems that are designed to function differently with temperature changes. The wide range of deflection, together with the proportionately great force exerted with changes of temperatures makes possible the operation of large sized valves and finer adjustments for small changes.

Another property which makes the metal of interest is found in its resistance to taking a permanent set under the application of heat and outside force. The metal strip used in making the first chart requires 6.5 ounces to obtain a permanent set in a temperature change of 100 degrees.

This valuable metal is manufactured in various standard thicknesses, ranging from .25 to .015 of an inch in thickness and may be obtained up to six inches in width by 36 inches in length. It may be stamped or pressed into practically any desired shape, and when annealed will have all its original inherent qualities. It is non-corrosive and the manufacturers claim that there is absolutely no slip of one metal on the other in the strip.

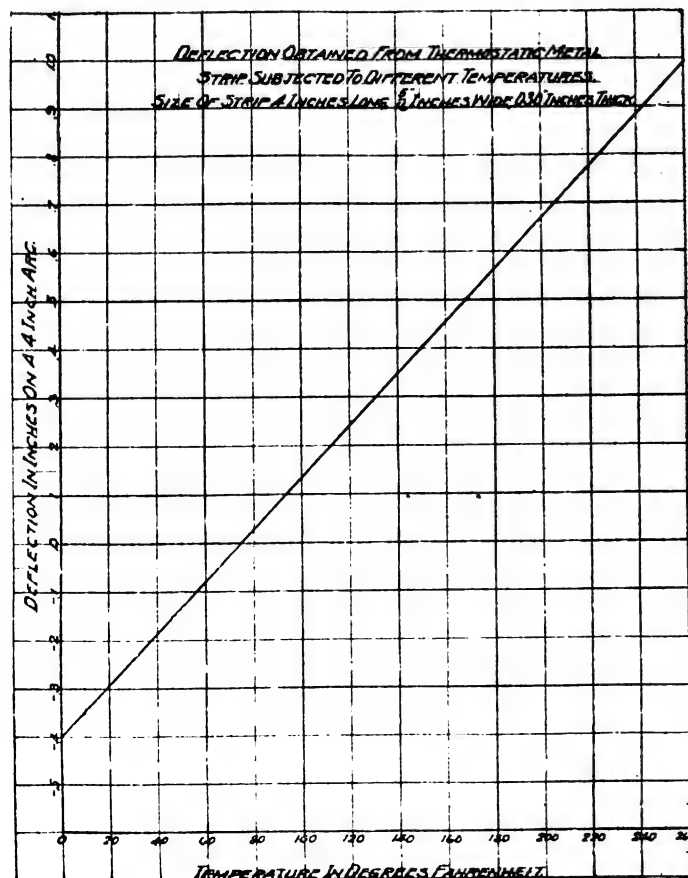


Fig. 1—Deflection Chart.

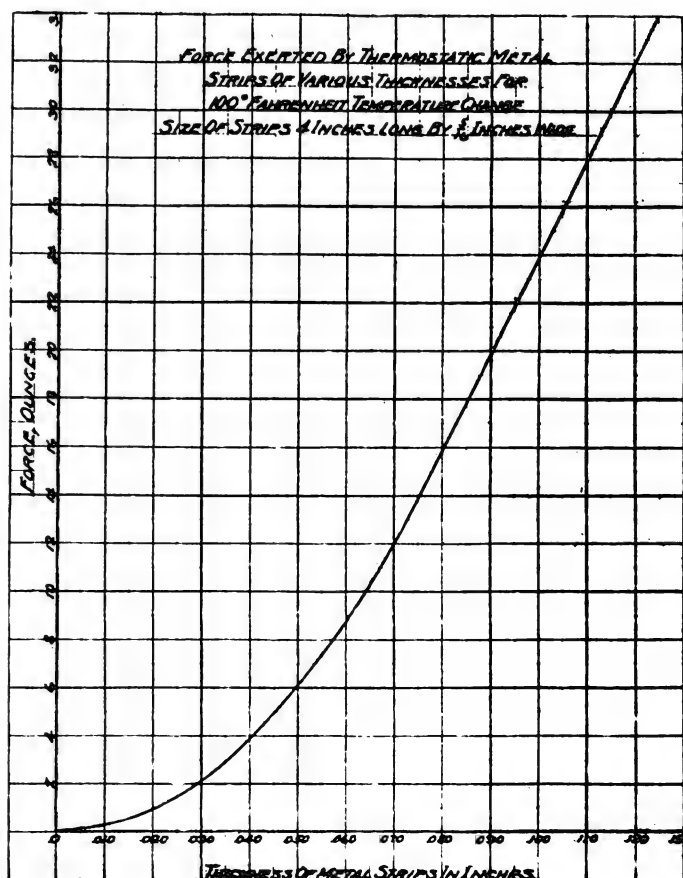


Fig. 2—Exertion Chart.



A Pyramid Made of Hyatt Roller Bearings Which Survived a Gruelling Long Distance Test Practically Unscathed. Insert: A Battle with Mud.

CONQUERERS OF MUD AND FRICTION

Mechanical Ingenuity Pitted Against Nature's Forces Wins Handsomely in the Modern Car

THE durability and longevity of wearing parts of a motor car in the early stages of the industry was largely conjectural, but modern methods of manufacture have eliminated to a large extent this uncertainty of life of the vital parts of the engine, running gear and frictional points. Owing to the various conditions under which a car is used and the difference in treatment that it receives in the hands of motorists, it has been impracticable to make any definite guarantees for long periods on the parts, as the only way to gather data upon which to base such a guarantee would be to keep track of the use of a large majority of all cars over an extended period. The expense of such a test would, of course, be prohibitive, but the history of many cars has been examined and verified with the result that some startling data has been secured by the manufacturers of parts, indicating the seemingly impossible wearing qualities of parts constantly under load and stress.

Probably the most remarkable and most interesting instance of this kind was uncovered by the Hyatt Roller Bearing Co. of Detroit. As the result of a prize contest conducted by the company several years ago, to locate the car that had traveled the farthest on its original Hyatt roller bearings, a Buick car was found that had been built in 1909 and which had covered some 261,800 miles. This car, of course, was awarded first prize and this year, as a means of demonstration, it was sent out on a cross-country tour of 12,000 odd miles to show

that the original bearings were still capable of many thousands of more miles of service. The car had originally seen service in almost every conceivable purpose that a motor car is put through, hauling heavy loads, pulling trailers and other work, but it is doubtful if any of this mileage was made under more strenuous road conditions than encountered on its cross country run. Gumbo roads, mountain grades, desert sands, over mountain ranges were all negotiated, and upon its return its mileage record stood at 272,962 miles. Not the least of bearing trouble was experienced and when the car returned the Hyatt roller bear-

ings were removed for the purpose of finding out what the effect of this tremendous grind had been. No evidences of wear were perceptible to the naked eye and even micrometrical measurements disclosed an actual average wear of four thousandths of an inch.

After satisfying themselves that the life of the bearing was so great that it would outlast the useful life of practically any motor car, the Hyatt officials had the bearings replaced and turned the car back to its original owner, who immediately put it into service again.

BATE LEAVES MITCHELL MOTORS COMPANY.

John W. Bate, vice president and chief engineer of the Mitchell Motors Co., Inc., has resigned. He was with the company since its organization and was also with its predecessor, the Mitchell-Lewis Motor Co. He has made no announcement concerning his activities in the future.

FRANKLIN IMPROVEMENTS.

Eight different bodies are supplied with the new series 9 Franklin chassis, which is the same by specification, although there have been several detail changes. An important one is a new piston which has slots cut from the bottom upward to the wrist pin line, allowing the clearance to be made very small. The slots care for expansion as the piston heats up. There is a new slip joint between engine and transmission, making the clutch action easier. A primer is now combined with the carburetor. A decided novelty is the use of a cold air intake pipe which brings all the air for the carburetor from an opening under the cowl.

The front springs are stiffer and $1\frac{1}{2}$ inches lower. New spring supports are used, the bolts being drilled out and lubrication supplied by wicking connected with small reservoirs holding enough oil for 100 miles or more at one filling. On the front axle a similar wick oiler is used for the steering knuckles, with a supply sufficient to last 500 miles.



Great Progress in Current Motor Car Design Is Shown In This Special Franklin Sedan.

Motor Modes for

Maids and Matrons



Left: Here is one of the very earliest modes of 1918 for the motorist. If she travels South at this season of the year she may wear this frock and hat and know she is clad properly. If she remains in the North she may know this is what she will wear in the Spring. Made of the new Ruff-a-Nuff silk, inspired by the Russian revolution. The white straw chinky hat is trimmed with printed khaki-kool and the knitting bag, which every motorist carries nowadays—is also khaki-kool.

Centre: The cape of fur is a strong favorite with the fashionable motorist and will be seen to a very large extent during the Winter and Spring. This smart model is made

of mole and ermine, and is so constructed that it may be worn snugly up around the neck or in the fashion shown in the illustration. Courtesy E. Albrecht & Son, St. Paul, Minn.

Right: The coatee of fur is a huge favorite and will be worn very late into the spring. Nothing could be more appropriate for wear in the enclosed car. This splendid model is of Hudson seal and natural black muskrat and shows the ingenuity of the furrier's art. Do you notice the fashionable motor woman invariably sports the swagger stick? Courtesy William Jackman's Sons, New York City.

By MRS. A. SHERMAN HITCHCOCK.

TO THE woman interested in motor-ing raiment a few hours spent in the great show rooms of some of the exclusive shops, searching new fantasies of fashion, will be a pleasure, for clothing designed specially for the motor can now be found in new and varied forms, showing all the little details of originality in cut and trimming so important in making any garment up-to-the-minute. Beauty is combined with utility and smartness of design which serve to make the wearer attractive instead of bizarre, as was formerly the case.

For country wear and touring in cold weather no coat is too warm and only the most sensible dressing can make such motoring a pleasure. Fur coats, or soft woolen ones lined with fur or leather, are the thing for such wear and the tailors and furriers have made ample provision to meet such demands. There is nothing really new in fur coats at this season of the year, save perhaps little differences in cut and collar.

Never were handsomer cloths made for motor coats than are now shown at the exclusive shops. The American weavers and dyers have combined in obtaining such delightful tones and extreme warmth allied to light suppleness. As usual the Worumbo wools are in the lead and we find Bokkara, Poilu, Hilendale, Tussok, Lamkin, Kashmir, Operafluf and Nanken in all the most artistic and beautiful shades. In obtaining this material the motorist may feel absolutely assured that there is nothing better obtainable and that it will give her com-

plete satisfaction throughout the life of the garment. The Polo Coatings, which have been popular for several years, are strongly in evidence again. This material has really become a staple article, owing to its unequaled wearing qualities for motor coats. All the modish shades are shown in the Polo Coating. The grays, browns and greens predominate, but there are the most delectable colors shown and every woman will be quite sure to find her particularly becoming color.

Box Coats Joy to Youth.

The straight box coat along boyish lines is very new, but this type of garment is not becoming to every figure; it is for youthful motorists only. The all-around belt has quite disappeared and the advance models show panel front and back and the belt effect showing only at the sides, where there is also a little fullness. Underneath the panel at the back there is quite apt to be a deep plait, which gives fullness at the bottom of the coat. A smart coat has a yoke outlined in cordings of the material, a kimono sleeve wide at the cuff, unbelted

fullness and a clever fastening at the neck, which brings the collar to a point considerably above the ears. There are three or four very new and good red shades among the new coatings and a yellow or two, but it seems as though on a whole colors are darker than is usual. Perhaps it is the subtle influence of the war, or again the general tendency is to get away from the glaring shades of the last two seasons, but it is certain that there are none of those brilliant—and hideous—hues which have been so common of late. Africa seems to have been the inspiration of many of the browns; we have Moroccan, Oasis, Africa, Egyptian, Tibbit, Banana, Ecorses. A handsome new blue is called Lupin.

In selecting a ready-made coat the motor woman must use discretion, for there are many pretentious models shown in the shops which are really hopelessly common place and have nothing to recommend them beyond the fact that they are warm and will wear well. The unbecoming cold, slaty grays, which to be sure do not show soil easily, are numerous, and many women buy them quite regardless of the fact that they would make the most stunning beauty look forlorn on a cold, windy day. There are some lovely coats in plain color, soft, thick, blanket like Worumbo woolens in dark red with a bloom on it, or in dark tobacco brown, or in dull, dark old blue. And these, made up by an expert tailor, make the most fascinating motor coats for all ordinary wear.

Probably the most lovely of the Worumbo cloth coats are the white ones;

long, ample, loosely made models, perfectly plain with no trimming save the large pearl or bone buttons and some heavy stitching. Big, full capes of thick, soft cloth are very useful things for supplementary wear, to throw on over a coat hardly warm enough for cold weather motoring, and some of these big capes have large hoods, which may be drawn up over the small motor hat if needed.

To Choose a Foulard Frock.

Every motor woman will want at least one frock of foulard, for the coming spring is to be a foulard season. The new designs are just now coming from the manufacturers. There are taupe, Copenhagen, green, brown, black and white foulards figured in various colors to harmonize. Very conspicuous the designs appear as one views them at first, but we soon become accustomed to anything new and learn to like them. The new line of Cheney foulards—the best grade obtainable—include many striking and handsome patterns. A brown is figured in yellow, green in pink, Copenhagen in a deep cream and taupe in white. The quality is exquisite and they



Every motor woman needs a suit of this character. Simple in design, but decidedly smart, this Prinzess model leaves nothing to be desired. The motor coat of fur may easily be slipped on over the suit for riding and when removed leaves Milady Motorist in excellent trim for shopping. Courtesy Printz-Biederman Co., Cleveland, O.

are just the thing for the smart little frock to wear underneath the coat. Zantine is to be a spring favorite, as will another silk, called Cinderella. The designs of Zantine, from which it takes its name, are close, allover patterns, originated by an Austrian designer, some in Oriental, Persian or futurist effects, some in many colors and others in just two tones. The Zantine designs combine very effectively with plain materials. The foulards are a twilled silk of light quality, strongly woven, in a diagonal weave. They are guaranteed shower proof.

Motor Sets in Fabric.

Motor sets, consisting of hat and scarf, and sometimes muff added, are being made of the Rodier fabric, which shows large squares of cut velvet alternating with a silk square. One set is in old china blue, the small hat having a high, soft crown and a brim of beige duvetyne. The scarf is very wide and is made of the beige duvetyne with deep plaited ends and a facing of blue. Another charming set is made of rose colored Petuna Cloth. The little round hat has a four section crown peaked high at the centre, and is bound with black chenille and has four ball pompons falling on the brim with a tire edge. The accompanying scarf is of the rose Petuna with black chenille fringe ends and a black satin lining. One still more ornate is made of geranium red Kashmir trimmed with blue satin. The scarf is lined with a silver brocade and a muff of the Kashmir is lined with the satin and has long silver tassels suspended at each side.

Blue green, chamois color, turquoise and bright coral pink are the most popular colors in motor millinery, while in the darker shades mahogany and rosewood brown is very much favored. Long nap beaver is extensively employed for the motor chapeau. A low crown and narrow brim rolled at one side are the most popular. Bowl shaped turbans for motor wear have two or three tier crowns and are covered with peacock's breasts and the vivid blue green of the peacock is very smart and becoming.

Bags and Other Accessories.

There are some very handsome new bags for the motor woman made of a combination of Egyptian leather and vachette. The Egyptian leather is also used with excellent effect with Pin Seal, Pin Morocco and Spanish Grain. The bags are most unique in shape and are equipped with double suspended inside pocket book, shirred pocket containing mirror and little compartments where many little articles may be stowed away. One unusually attractive bag is a long and narrow shape, slightly widening out at the centre and ending in a point from which is suspended a three-inch leather tassel. The new fox tail chain is used on this bag. The fox tail chain, so called by the manufacturers, is a long, narrow, straight handle, which can be slipped over the arm and carried thus for convenience. The newest bags are thus equipped. There are very handsome motor bags of chiffon velvet in a variety of



One of the smart Palmer Garment Coats for motoring. Its excellent tailoring and designing give it the smart lines and comfortable fit that the motor woman especially desires. This garment comes in several modish shades. Courtesy Percival B. Palmer & Co., Chicago, Ill.

styles, commodious and convenient. The most attractive are beaded, usually the cover, but sometimes the entire bag carries a handsome design in beading. They are for the most part equipped with the fox tail chain and have innumerable little compartments inside. There are some good style motor bags of duvetyne, clasped in amber and other very new ones made of row upon row of chenille cord. A model, made by one of the leading manufacturers, is called the "Tuxedo," and is of fine pearl goat leather. A peep under the flap of this smart bag discloses a style for the discerning women who appreciate individuality. It also may be had in panther grain leather and in vachette.

The new separate skirts for immediate wear at southern resorts for motor women do not exploit any radically new style, but they are extremely attractive. Dragonia Shantung is probably the most popular of all materials for this purpose and Petuna Cloth is also well liked. The skirts are extremely short, being narrow at the hem, with a slight fullness at the hip. The most important new skirt feature is the half tunic which we see everywhere. This tunic consists of an overskirt, either in front or at the back, but never extending all around the skirt. It is fastened at the sides with the side seams of the skirt, is of the same fullness as the skirt, and terminates about

half way to the hem on one side and two-thirds to the hem on the other. The new skirts have a pocket on one side only and it is usually given a decorative outline of embroidery or tiny buttons.

AMERICAN BUREAU OF ENGINEERING INJUNCTION.

The American Bureau of Engineering, makers of AMBU, the Electric Trouble Shooter—through their attorneys appeared before Judge Carpenter in the United States Circuit Court and secured a restraining order prohibiting the sale of the so-called Official Wiring Guide as published by the International Motor Institute.

The contention of the American Bureau of Engineering was that the wiring diagrams published and offered for sale by the defendants are deliberate copies of the 400 copyrighted, authentic wiring diagrams of the American Bureau of Engineering. As part of the comprehensive information comprising AMBU service, the AMBU wiring diagrams, distinguished by the circular copyright imprint of AMBU, are looked upon as standard and authoritative and the garage men should therefore be apprised of this action. The injunction was sustained when the case was heard in court.

FORD FIXES MAXIMUM PRICE LIST FOR USED FORDS.

The Ford Motor Co. has sent to Ford dealers throughout the country a list of maximum prices at which Ford cars are to be taken in trade. The list is based on cars in the best of condition and the allowance price is to be in no way affected by the number of cars sold in any one instance. In Detroit the dealers received the following list:

Model	1912	1913	1914	1915	1916	1917
Touring.....	\$85	\$90	\$100	\$135	\$150	\$225
Roadster....	75	80	90	125	140	215
Coupelet....	..	..	..	240	235	300
*Coupelet....	..	..	..	..	..	400
Sedan.....	..	..	..	325	375	525

*New style.

Ford dealers at Baltimore have published a similar list in which the allowances are higher. The list is as follows:

Model	1914	1915	1916	1917
Touring.....	\$150	\$175	\$180	\$235
Roadster....	125	150	160	200
Chassis.....	100	125	135	165

Additional equipment on a used car is allowed for at the rate of about 25 per cent. of its original cost, except in the case of self starters, which are allowed for on the basis of about 50 per cent. of their original cost.

SUPPLYING IGNITION PARTS.

The parts used in the electrical equipment, the very heart of the automobile, engage the attention of every automobile dealer and repair man in the particulars of their quality and the maintenance of an adequate supply. The necessities of service are prone to require the maintenance of a department and an extensive stock which runs up into a large sum of money. To obviate such difficulty and fill the dealer's need the Specialty Manufacturing Co. of Arlington, Mass., makes a general supply line known as the "Superior" parts. In marketing them the company emphasizes these points: Prompt attention to every order; the making of parts from the finest grades of materials; the most attractive prices to be found in this market and the making of deliveries when promised. These elements of their goods and service have played an important part in the huge success of "Superior" parts.

GOODRICH MEN STRETCH HANDS ACROSS THE SEA

This cablegram has been sent by the 22,000 employees of the B. F. Goodrich company to their comrades employed in the Goodrich factory at Colombes, France:

"The officers and employees of the B. F. Goodrich company send their best compliments and wishes to the French Goodrich company for the coming year, for the success of the allied armies in the ranks of which are 1600 American Goodrich employees, who are striving to bring nearer the permanent disablement of the 'boches' at the same time their 22,000 comrades support the war."

Most of the rubber workers abroad are Legion of Honor men who have been invalided out of active service by wounds.

MOTOR MECHANICS WILL RECEIVE ARMY COMMISSIONS.

Men who have had experience as motor repair foremen, between the ages of 28 and 45, are eligible to apply for commissions in the motor mechanics regiments that are now being formed under the Signal Corps. These men will officer the repair corps, which will have charge of the maintenance and upkeep of all motor equipment in the United States service, including aeroplanes, motor trucks, cars and tanks.

The examining board which passes upon the applications is holding three sessions weekly at present at the plant of the Packard Motor Car Co. in Boston.

ENSIGN P. W. PAGE LOST AT SEA.

Ensign P. W. Page, formerly connected with the Boston branch of the B. F. Goodrich Rubber Co., was drowned off the coast of England while on duty in a seaplane. He enlisted in the service last May and is the first of 1624 Goodrich employees who enlisted to meet death on duty.

PROF. FILES HEADS MAINE A. A.

Association Cooperating in State's Road Building Programme Assured in 1918

AT THE meeting of directors of the Maine Automobile Association, held in Portland, Prof. G. T. Files of Brunswick was re-elected president of the organization. Hon. John Clark Scates was re-elected secretary and treasurer and the following vice presidents were elected: First vice president, Hiram W. Ricker, Sr., Poland; second vice president, Charles H. Fogg, Houlton; third vice president, Forrest H. Colby, Bangham; fourth vice president, R. J. Peacock, Lubec; fifth vice president, Wilfred A. Hennessy, Bangor; sixth vice president, E. B. Sanger, Bangor; seventh vice president, Walter B. Parker, Cape Elizabeth; eighth vice president, Oakley C. Curtis, Portland.

The following chairmen of committees for the ensuing year were appointed:

Legislative committee, Chas. S. Hichborn, Augusta; road book committee, D. W. Hoegg, Jr., Portland; road signs and prison labor committee, A. Q. Miller, Auburn. These chairmen will name the remainder members of their committees. Mr. Hoegg already naming his road book committee as follows: George T. Files, Brunswick; Walter B. Parker, Cape Elizabeth, and William D. Pennell of Lewiston.

D. W. Hoegg, Jr., was re-elected chairman of the information and publicity bureau, which has headquarters at 12

Monument square, Portland. It was decided to publish the annual edition of the association's road book and announcement was also made that Maine's road building programme would be carried out and while the highway department would devote its energies mainly to constructing such arteries of travel that would prove valuable in war time, all of the secondary highways would be maintained during the coming year.

NEW SCRIPPS-BOOTH ORGANIZATION PERFECTED.

The new organization which will conduct the affairs of the Scripps-Booth Co., now controlled by General Motors, has been perfected with the election of W. C. Sills as director.

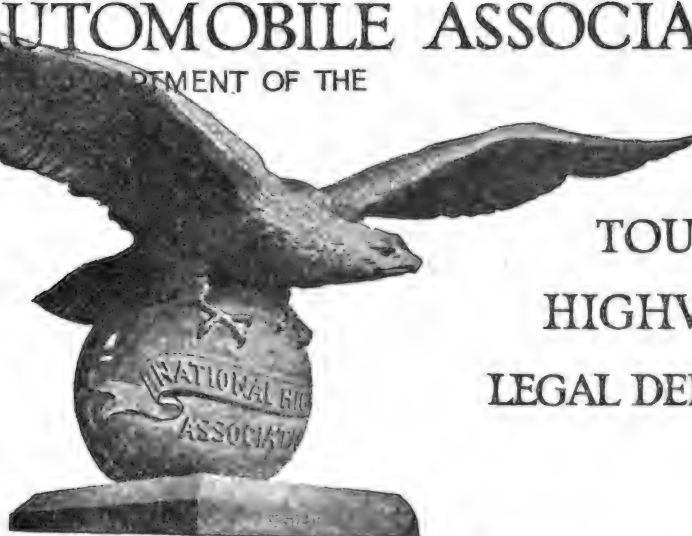
The officers are: President, A. H. Sarver, formerly manager of the Buick Motor Co.; directors, Fred W. Warner, president and general manager of the Oakland Motor Car Co.; Edward Verlinde, president and general manager of the Olds Motor Works; W. C. Sills, general sales manager of the Chevrolet Motor Co.; W. H. Little, formerly president of the Sterling Motor Co.; F. J. Sensenbrenner, vice president and treasurer of the Kimberly-Clark Co., Neenah, Wis., and N. J. Miller, a banker of New York.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Motorists Should Unite Against Class Taxation

**Burdensome Laws, Unfair Exactions and Unjust Restrictive
Legislation to Be Avoided Only by Prompt Cooperation**

TO MEET the exigencies of war time conditions considerable legislation will be enacted this year in the various states and many of these statutes will effect the motorist, either as a direct or indirect tax. Many of these laws will be judicious, while many will not and would never pass if they met with opposition from motorists in organized form. The tendency to single out the motorist above everyone else to levy upon and legislate against is too pronounced throughout the country to be overlooked and the situation emphasizes the need of cooperation among motorists so that they can unify and strengthen their opposition to a point where it will be effective in checking the discriminatory practices.

Evidence in proof that many of these laws are hastily and unwisely drawn is on hand in many instances, and is overwhelming in the case recently cited in New Jersey. Provisions in the laws of 1917 session of the New Jersey Legislature, which is one of the foremost industrial and educational states in the Union, proved so impracticable and unreasonable that the chapters of the laws in which the objectionable provisions were incorporated have been suspended by William L. Dill, Commissioner of Motor Vehicles of the state. Truck operators, who were mainly affected by these provisions, know these provisions were being incorporated in the law last year when it was being drawn and had there been some authority or association in which they could have centralized their

opposition, such an absurd statute would never have been enacted for such a short life, even to cause so much trouble and unnecessary expense.

The individual motorist, even in the face of the numerous flagrant injustices that are heaped upon him year after year, does not recognize that the one avenue of hope to escape burdensome taxation and restrictive legislation is through cooperative opposition by allying his own influence with that of other motorists through an association which carries the weight of all its members in hearings before legislative bodies and officials. There is no better exemplification of the power of cooperation than that shown in the present campaign of the automobile manufacturers and conducted through its organization to have the three per cent. tax on car sales repealed. The Ways and Means Committee of Congress and the Senate Finance Committee have been appealed to on the grounds that the tax is unscientific and it is proposed that the tax be placed directly upon the user. It is a common belief in the industry that if it had been represented at the hearings before the law was passed, with the same unified strength and influence with which it is now appearing for the appeal, the tax would never have been levied in its present form.

A more flagrant case of class taxation could hardly be imagined than that which it is understood will be proposed by Governor McCall of Massachusetts in his inaugural address. It is reported

that a special tax of \$5 on each automobile will be recommended and also that the drivers \$2 fee be increased \$3 to \$5. No good reason is offered why the automobilists should bear this extra tax to augment the state's treasury unless it is that the motor car is the handiest object to reach and the owners submit without the strenuous objections they should raise. Should such a tax be imposed it would mean that the automobile is subject to four direct taxes if an old one and five if a new one. The government is now collecting a tax of three per cent. of the selling price of a new car and while this is paid by the manufacturer, it is, of course, being paid by the user; the purchaser is taxed on the car for its personal property valuation in the city where he lives; the state collects a license tax which is far out of proportion to any other tax that is levied against property; the owner is also taxed for the privilege of operating the car. Motorists constitute as substantial an element in a community as any other class and realize that taxes are necessary, but this attitude should not be taken advantage of by tax commissioners and legislators to single them out to bear the burden whenever additional funds are necessary.

There seems to be little attempt to levy taxes equitably by placing them on all forms of personal property that would come in the same class as automobiles. There is no good reason why private horse drawn equippages, pianos, musical instruments, costly house fur-

nishings or other personal property of this character should not bear its proportionate share of taxation. In view of these facts the motoring public of Massachusetts will be strongly opposed to the proposed additional taxation and organized opposition has already been instigated. The automobile interests sent a letter to Governor McCall recording the opposition of the organization and will continue active in the fight against its adoption.

The letter, which was signed by officials of this association and all the leading automobile organizations in the state, was as follows:

Boston, Mass.
Dec. 28, 1917.

His Excellency, Samuel W. McCall,
State House, Boston, Mass.

Your Excellency—We have been informed that you have been requested to urge in your forthcoming message to the Legislature the necessity of raising additional funds during the present war, and that it has been suggested to you that you urge upon the Legislature the passing of a law taxing automobilists of Massachusetts \$5 each and of raising the fee paid by operators to \$5.

If we have been correctly informed we respectfully wish to protest against the passing of any such law, and respectfully urge you not to make such a recommendation in your forthcoming message.

We believe that as a body the owners of motor vehicles are patriotic; that they are lending their aid to the government in various ways to help along in the war work, and that they will be willing to do so in the future. We do believe, however, to have the motor industry solely singled out as a means of revenue at this time is unfair. If it should be decided that all vehicles such as horse drawn vehicles, street cars, as well as the motor vehicles, should be charged a war fee, we shall be glad to assume this added fourth burden.

The motor vehicle is not a luxury. The motor owners contribute now in registration fees some \$2,000,000 to the state, while in personal property taxes they contribute many more millions, and the industry as a whole has added millions to the taxable values of the State of Massachusetts, while giving employment to thousands of men and women who receive good wages.

In addition to the above the government has placed a war tax on motor vehicles.

If agreeable to you a committee representing the automobile interests in our commonwealth will be glad to wait upon you.

One strong point of opposition that will be brought up is the practical exemption of horse drawn vehicles from taxation that is supposed to be for the purpose of constructing and maintaining highways. Horse drawn vehicles use the highways and in service damage them as much, if not more, than motor cars, yet contribute practically nothing toward constructing them or their upkeep. If more money is required of an automobile operator for the privilege of operating it, why should not the driver of a horse vehicle also pay a tax?

William J. Tyler has been appointed as a member of the board of trustees of the National Automobile Association to fill the vacancy created by the death of William B. Plunkett.

Our Letter Box

Members Commend Service of Legal Department of N. A. A.

Many testimonials in the form of letters are on file at N. A. A. headquarters commending the service that has been rendered to members by the legal department through handling their cases in the courts. This department, which gives expert legal advice and assistance, defends members and their operators for violations of automobile laws anywhere in New England, and also in suits brought against members for damage to property, injuring or killing animals or damaging vehicles and in the adjustment of repair bills.

Through experience gained in specializing in these kinds of cases the department is especially efficient in handling such matters and its members, while receiving the service free as part of their membership, can feel assured that their cases are handled with dispatch and with the same consideration for results as if taken care of by their own attorneys.

A member who recently called upon the association's legal department to handle a case in which he became involved, wrote the following letter regarding its disposition:

National Automobile Association,
9 Park St., Boston, Mass.

Dear Mr. Power:

I thank you very much for looking after the automobile case against my chauffeur, ————. I am very much pleased with the disposition you have been able to make of the case and if there is any charge that you have against me for any of the service you have rendered I shall be pleased to make remittance.

There was, of course, no charge for this service and the member was so informed.

Another less recent case in which a member warmly commended the association for its work is shown by the following letter:

George H. Power,
National Automobile Association,
Boston, Mass.

Replying to your letter of the 22nd, I am enclosing herewith a check for \$50, payable to ————.

I certainly appreciate your attention in this matter and am perfectly frank in saying that it is better than I expected.

I told a friend about it and as a result he wants to join the N. A. A. Will you be good enough to send an application blank to him.

CAR LEFT IN THE HIGHWAY AFTER DARK.

Judge Crosby of the Supreme Judicial Court of Massachusetts in an opinion handed down in the case of the commonwealth against a defendant charged with operating an automobile after dark without displaying lights as required by the statute, rules that an automobile which is standing upon a highway after dark without lights and with the engine

at rest is an automobile "operated" within the meaning of the law.

The case has been in the courts for several years and has attracted widespread attention owing to the point of contention. The defendant was found guilty by the First District Court of Eastern Middlesex of violating the provisions of section 7 of chapter 534 of St. 1909 as amended by section 3 of chapter 16 of St. 1915. He appealed from the verdict and at the trial in the Superior Court he excepted to the refusal of the presiding judge to give to the jury four instructions, each of which in effect amounted to a ruling that he was entitled to an acquittal upon the agreed facts. The facts agreed upon and part of the decision of Judge Crosby follows:

"It is hereby agreed between the government and the defendant that on May 3, 1915, at about 8:30 in the evening, more than half an hour after sunset on said date, the defendant drove his automobile on Pleasant street, a public way in the City of Malden, in said County, and left it standing thereon; that when and as he drove it on said street it was properly lighted, but that when he left it standing as aforesaid he turned out both his front lights and rear light; that when he left the automobile standing, no part thereof was moving and that the engine was stopped; that defendant thereafter went into a building nearby, leaving said automobile on said street until notified."

The statute under which the complaint is drawn was enacted largely for the protection of travelers upon highways, by guarding against collisions with automobiles after dark when it would be difficult or impossible to know of their presence. The question is, whether an automobile which is left standing upon a highway after dark without lights and with the engine at rest can be found to be "operated" within the meaning and intent of the statute.

It is obvious that an automobile standing upon a highway under such conditions may be fully as great a menace to the safety of travelers as if running upon the way without lights, and that the danger of serious injury to travelers by coming in contact with such an automobile would be very great.

The word "operated" is not, as the defendant contends, limited to a state of motion produced by the mechanism of the car, but includes at least ordinary stops upon the highway, and such stops are to be regarded as fairly incidental to its operation. It does not appear from the agreed facts how long the automobile had been left upon the street or for what purpose the defendant went into the building. Certainly there is nothing to show that he had left it for an unreasonable time, or that the stop was not for a proper purpose; nor is there any evidence that the car had been abandoned.

The statute must be read with reference to its manifest intent and spirit and cannot be limited to the literal meaning of a single word. It must be construed as a whole and interpreted according to the sense in which the words are employed, regard being had to the plain intention of the Legislature. So considered, we cannot doubt that the statute is broad enough to include automobiles at rest, as well as in motion, upon the highways. *Jaquith vs. Worden*, 73 Wash. 349. *Stroud vs. Hartford*, supra. So far as the case of *Harlan vs. Kraschel* 164 Ia. 667, is in conflict with the views herein expressed, we are not disposed to follow it.

The defendant's requests for instructions were rightly refused.

Judgment affirmed.



WORKING FOR BETTER ROADS

Good Conditions Will Be Maintained on Many of Important Thoroughfares

WHEN the government at first notified the highway departments of the various states that construction work should be concentrated on the important routes of travel so that they would be in condition to handle the big volume of haulage that will have to be diverted from the railroads, the belief became quite general that highways in many sections would deteriorate through lack of maintenance.

As practically all the main routes of travel through the various states which have already been improved with various kinds of modern surfacing come within the government's designation of "important arteries of traffic," these roads will be improved and repaired according to the original schedules in most cases, while in several states the legislators are ready to provide additional funds to extend their highway systems to roads of secondary importance especially in cases where such highways afford a means by which the farmers can drive to market and deliver their produce.

In the first stampede to curtail everything that was thought to be in the "non-essential" class, the automobile and the great netway of improved highways throughout the country were attacked, but since the first flurry of excitement attending the entrance of the country into war subsided, a saner view is being taken and the authorities are looking forward to the automobile and the highways as the only salvation from an almost hopelessly congested transportation situation. Thousands of passenger trains are being taken off and other means of transportation restricted to the ordinary run of business. Business must turn to the automobile if it is to live up to the recommendations of President Wilson, who said:

"It is evident to every thinking man

that our industries, on the farms, in the ship yards, in the mines, in the factories, must be made more prolific and more efficient than ever and that they must be more economically managed and better adapted to the particular requirements of our task than they have been."

Means of commutation and transportation other than that of the railroads is absolutely essential to the efficient conduct of all business and there is none other so convenient and quick as the motor car and its use demands improved highways.

NO SPARE TIRES IN CITIES.

Detective Lieutenant Parker of the Detroit police department advises against the custom of carrying a spare tire about when driving in cities. His advice is based on the fact that there are plenty of garages about in a city that can be called upon in case of need and that the spare tire better be left at home to be carried only when trips in the suburbs or tours are to be made, as its presence on back of the car only serve to tempt thieves.

AUTOMOBILE INSURANCE.

A member of the Detroit Automobile Club who recently returned to that city, reports that the insurance company with which he had his car insured canceled his policy when he informed them that he had again become a resident of Detroit.

In explaining the reason for the company's action, the secretary wrote:

"We have your letter informing us that you are now living in Detroit. We regret that it is impossible for our company to write any insurance on cars

used and owned in Detroit. It is well known that Detroit and Chicago are two of the worst cities, so far as automobile insurance is concerned, and we would not care to write your car at any price."

LARGER EDITION OF THE "RED ROAD BOOK."

The new edition of the "Red Road Book," which is given with memberships in the National Automobile Association, is greatly amplified and contains all the necessary touring information covering the principal routes and highways in New England, New York, Pennsylvania, New Jersey, Maryland, Delaware, Virginia and West Virginia. While the New England district is covered most thoroughly, there are also road maps of all the states named and this year there are nearly 200 itineraries, giving mileages and details of routes, this section of the book comprising 73 pages alone. The use of these itineraries in touring or making trips eliminates practically all of the inconveniences coming from losing the way, as the directions are so detailed and complete that one can keep on the route with a certainty by occasionally glancing at the book for instructions. Used in conjunction with the maps in the book, the itineraries enable one to plan long distance tours with accuracy, determine the mileages in advance and provide for hotel and garage accommodations.

GASOLINE CONSERVATION.

Judge Bruce in the District Court in Boston fined a motorist \$10 for leaving the engine of his automobile running without the machine being attended. It is not stated what reason the motorist gave for allowing his engine to burn up fuel needlessly, and while he was answering for a violation of a law it is possible that the judge had in mind the fact that it is the duty of every motorist to his country at present to conserve gasoline.

PLATE 14 B.

STUCCO GARAGE OF SPANISH EXTERIOR DESIGN

Special Drawings of an Attractive Building That Will
House Two Motor Cars and Be an Ornament to an Estate

Designed by the Architectural Department of The Automobile Journal Publishing Co.

A NUMBER of the less expensive types of private garages have been dealt with in the Architectural Department to meet the demand for structures of that type. There are, however, many persons with means who desire the best housing for their car that they can procure and one that shapes up with the style of their home. Such an investment is not an extravagance, as it greatly enhances the value of the property upon which it is placed, besides affording the owner far more pleasure and service than he could obtain from his cars with a cheaper structure, or by keeping them in a public garage.

In the accompanying plan detail is shown of a garage that should cost about \$6000 under average conditions, and one that provides complete equipment and appointments for housing two cars and chauffeur's quarters. The exterior is fashioned after the Spanish type of architecture and presents a very attractive appearance with the two large front doors and pergola, surmounting the pediment. As indicated in the elevation plan the roof slopes gently from the peak and is carried out beyond the sides, modifying the otherwise rugged effect of the square structure.

With a length of 29½ feet and a width of 28 feet, the building provides ample room for two cars and the chauffeur's quarters. The latter are located in the rear of the building and include a living room 16x9½ feet, a lavatory and a closet. The living room is ventilated and lighted with two windows, and has a door opening into the garage proper.

Besides the two main swinging doors which have glass panels in the upper halves, there is also an entrance on the side. The doorways are eight feet in width, with two four-foot swinging doors in each.

The building is of semi-fireproof construction, having terra cotta walls with stucco facing on the exterior and plaster on the interior. The wall is 10 inches thick, eight-inch blocks being used with an inch of facing on either side. The interior partition walls are made of brick four inches thick and covered with plaster. The ceiling is also plastered in, the plaster being laid on metal laths, thus finishing the interior neatly and in accordance with fireproof construction regu-

lations. The lighting is thus made more effective also by day or by night.

The roof is built up on trusses laid 10 inches apart, which rest on a 10-inch I beam, and the rafters project beyond the eaves. A very durable roof for this type of construction is made up of a six-ply tar and gravel roofing, laid on seven-eighths-inch North Carolina pine matched roofing.

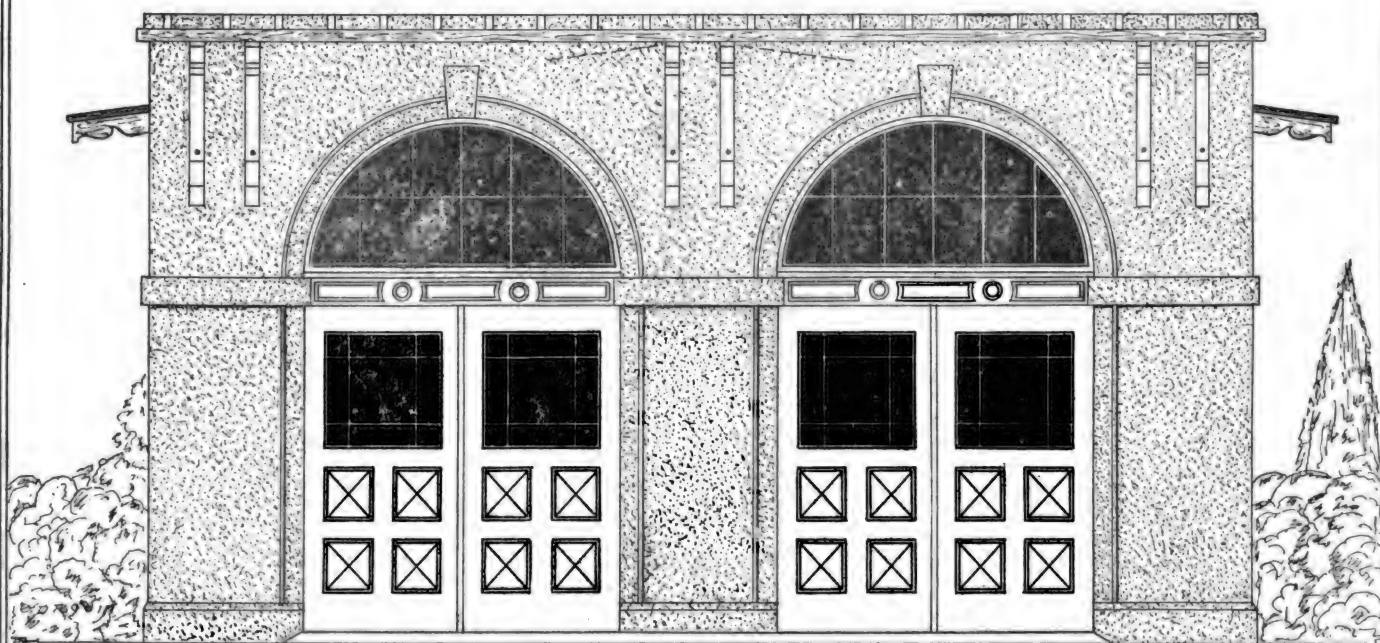
The concrete foundation wall should be a foot thick and extend below grade 3½ feet. It should be made of one part cement, two parts sand and five parts coarse gravel or crushed stone. To preserve the fireproof feature of the structure a concrete floor should be used. This should be at least four inches thick, the first three inches of one part cement, two parts sand and five parts of coarse aggregate, and the surfacing layer of one part cement and two parts sand.

With the floors sloped and drains provided, it is a good plan to install an overhead washing system, which enables the chauffeur to do the work efficiently and with little loss of time. The piping for such an apparatus should be installed during the erection of the walls, so that the installation will not disfigure the interior of the garage.

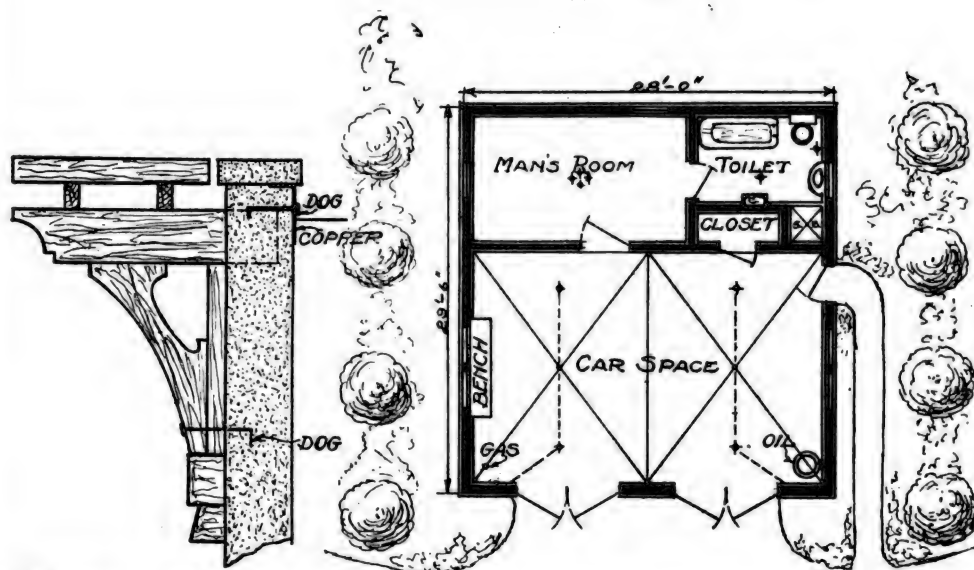
Attention is called to the detail of the pergola, an ornamental effect attesting the southern origin of the design and its primary intent for an estate in the south land or Florida, where the detail of a heating plant would be superfluous. Wall pipes may be supplied for heating from the estate heating plant in case of its adaptation to a more northerly location as is entirely feasible. The arms of the pergola, it will be observed, are set in the wall securely and held in place by dogs. These, with the projecting ends of the rafters, which are cut as shown in the plan, produce at once a quaint and striking architectural effect. Shrubbery arranged in accord with the design is a heightening influence well worthy of the outlay.

The natural lighting and artificial lighting layout insures a good illumination of all objects in the garage at all times. The large arch windows over the door may be hinged or unhinged as desired. Large windows in the upper half of each door assist the interior lighting, as well as add to the outward appearance.

PLATE 14

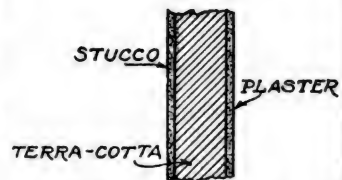


ELEVATION
SCALE



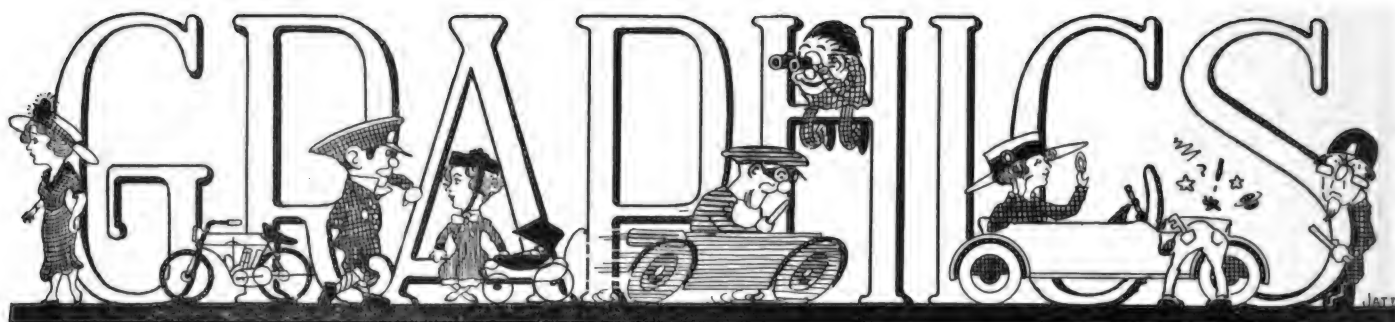
DETAIL OF PERGOLA
SCALE

PLOT PLAN
SCALE



WALL DETAIL
SCALE





It is not proposed to attach any state registration or municipal identification tags to military cars. They will bear simply the legend of their department and "U. S. A." The military authorities will prevent interference by state or municipal police.

Fortune awaits some inventive genius who can devise some use for old auto markers.

So few new markers appeared on motor cars in New London, Conn., the first week in January that observers stood aghast at the situation, especially as the authorities this year had filled all requests up to Jan. 1.

Some car thief who does not respect honest toil had the innate meanness a few nights ago to steal the automobile belonging to a washer woman in Arlington, Mass. The car was later recovered by the roadside where the thief had left it after using up all the gasoline. The



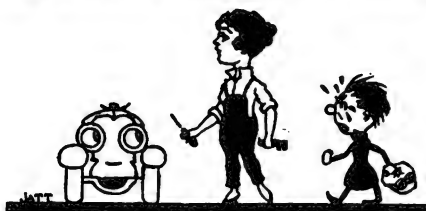
publicity arising from the incident was the first revelation to the world that this really modern washer woman introduces into her work a motor car, with which all her work is called for and delivered, just like a modern machine laundry.

In the last year the Detroit Automobile Club has handled 75 cases of car theft, 60 cases of arrest, investigated 130 cases of constables reported and 110 miscellaneous cases. A blank is sent to all members for data on tires to aid recovery in case of theft. This blank lists the make of the car, factory number, license number and the number and make of each of the tires, together with the name and address of the owner.

An increase of three cents a gallon in the price of kerosene in New England in the ill favored days of midwinter is another war time rise that rocks the average citizen from fender to tail light. It makes the motorist just a little bit uneasy, too, as to what will happen with gasoline the coming season. Also, what's the use of longing for a day of kerosene fuel if it is going to rise on the same

sky path that its sister constituent flew.

A real 1918 edition of the modern business woman holding forth in a business



establishment on Massachusetts avenue, Boston, is an expert scientist on motor car carburetors. Hundreds of times a day this girl is called upon to test carburetors, direct their repair and explain the mysteries of this complicated accessory to car buyers and operators. The firm is well pleased, for when an angry customer dashes into the trouble room burning with a lot of fiery language which he would like to unburden, he is compelled to desist from the motives of chivalry and soon depart with a smile with the trouble entirely adjusted.

Driveaways from Detroit to Boston insured the arrival of new passenger cars for a number of Christmas presents in the Hub this year. For a long time philosophers have said that there is a woman at the bottom of everything. At any event the observation holds good this time, for there were three coupes particularly that the dealers felt they must have and after considering the traffic situation from all angles they decided to send three of their best men to Detroit to drive them into Boston through rain, snow, mud, sleet and anything, just so they would reach their destination by Christmas. These coupes were to be Christmas gifts to three young women in Boston, and their disappointment would have been keen if they did not arrive. These fortunate young women will not mind now what the government does with the railroads.

No matter what Winter does to the general landscape the motorist takes advantage of it. When the New Year was



ushered in by an Arctic transformation the Hudson river became a tempting ice bound level. This condition brought about a new sport—fishing from an automobile. Fishermen and bird shooters had several glorious days pursuing their prey up and down the frozen river.

"What the Automobile Has Done for Mankind" is the subject to which school-boys wrote for prizes in Springfield, Mass., recently, in a contest conducted by the Williams Motor Sales Co. of that city. Leading literary lights of the city passed on the boy essayists' productions. It is apparent to anyone that the good that was done towards proving the essentiality of the automobile cannot be measured by the sum of \$15 expended in the enterprise.

Automobile owners in Pittsburgh have set up the novel plan of putting the sign "Welcome" on their machines and carrying to their destinations passersby who apply for passage. Money paid as



fares for the accommodation goes to charity. The enterprise is so well appreciated that the city board of trade has indorsed it.

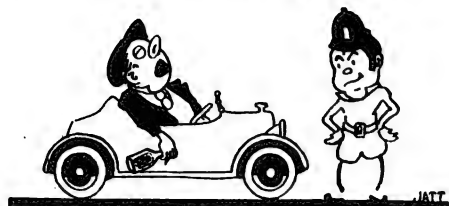
The Massachusetts Automobile Operators' Association has subscribed over \$300 toward a fund which it is raising to purchase an ambulance to be presented to the Boston Metropolitan Chapter of the American Red Cross. It will be used in Boston in handling wounded men and officers brought to that city from the front. Every automobile operator in the state has been called upon for a subscription of \$1 toward the fund, which will be used for purchasing as many ambulances as possible.

Now that Uncle Sam has taken over the control of the railroads there are busy days ahead for the automobile and its manufacturers. There will be opportunity aplenty for the quick use of cars. Many trips will be made by automobile that will mean the difference between success and failure to some business man. At such times the true utilitarian worth of each car will be tested.

Governor Whitman traveled purposely from the state capitol to the metropolis to be present at the opening of the National Automobile Show. He said he wished to emphasize the importance of the motor car in war time. His address gave evidence that he had studied carefully the methods of motor transportation in its relation to the movement of artillery, equipment and machinery for the army.

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Making a sleeping car out of your automobile is one thing that is not permitted in Astoria, N. Y. A young man who had taken his best girl home from



the theatre had a case of engine failure on the way back. When he entered his car he was overcome with drowsiness while waiting for it to start, so he said, fell asleep and slept three hours. The police gave him a less airy bed for the rest of the night.

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San Francisco high school boys and high schools girls were able to earn a tidy bit of Christmas money in a membership drive made by the officials of the California State Automobile Association. The association's work in sign posting roads was pointed to as a benefit to every motorist, as well as its record of continuously fighting for better roads and highways.

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Worcester, Mass., motorists are inclined to get together and wreak summary vengeance on the new traffic rules which will not allow a man to leave his seat to go into his own place of business for one minute to get his gloves or something else he may have forgotten. No stop is allowed by the curb long enough to allow a customer to enter for



the most trifling purchase. The police are enforcing the ordinance and intend to do so until the business men get it repealed.

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The last section of the concrete highways between Hamilton and Toronto has been finished and the road is completed. The road is 36 miles long, 25 yards wide at the Toronto end and 18 yards wide on the Hamilton terminal. Its construction was begun in November, 1914. The construction work required 157,000 barrels of cement, 125,000 tons of stone and 70,000 tons of sand.



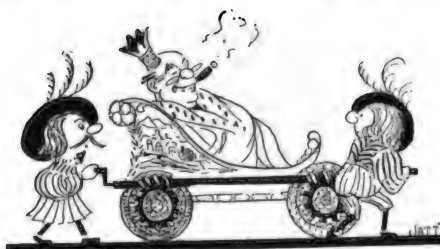
The civil authorities of New Britain, Conn., presented something new in the line of civic investigations by forming a commission to sit on the police patrol and decide that it was not fit for use as an ambulance to continue to carry patients to the local hospital. The police board set up as a defense that it had been so hard pressed for funds that it had been impossible to have repairs made.

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This is an excellent time to "make good" on resolutions for the new year. One of the best is to decide to have a new car, and get it.

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From an old Spanish print comes the ever old, ever fresh lesson that when King Solomon said there was nothing new under the sun he was thinking clear beyond this present age of motor cars and far into the future. The old print



shows a primitive worm gear design applied to the king's car and with power furnished by plumed knights of the crank back in the middle ages. When one thinks of the worm gear antedating written history, one acquires a decided respect for Archimedes, Solomon, Columbus and a few other immortals who have left a decided imprint on the old terrestrial ball now wobbling with the weight of a fierce war on one side of it and general void and blackness on the other.

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Pittsburgh dealers know that night-lighting is one of their big advertising assets. But they do not hesitate to face patriotic necessities and were in line to save fuel when the pinch came recently.

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The taximeters in Boston are busy again running up many slushy, muddy miles on the Hub's delightfully curving streets. After a labor dispute the taxi



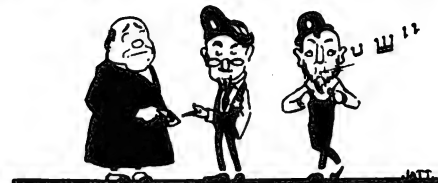
drivers came to terms and it is now once more possible for a State street man in a hurry going up Beacon street to meet himself coming down again.

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One of the greatest surprises in an ice storm is to observe how many motorists go out or allow themselves to be caught out without tire chains.

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Poetic justice some times overtakes petty magistrates and village constables who take delight and thrive on arresting and imposing fines on automobile drivers. A magistrate and two constables in a New Jersey community were recently



convicted of maintaining a blackmailing conspiracy of this sort and were sentenced to terms in jail.

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Taking over the operation of the railroads by the government accords more recognition to the passenger car and motor trucks as transportation factors. The removal of more passenger trains from a schedule already greatly reduced was one of Director McAdoo's first steps toward relieving railroad congestion at terminal points. While railroad officials might have disliked to take such action, the government director does not hesitate to require that more passengers and more freight be moved for short distances by motor vehicles on the ordinary highways.

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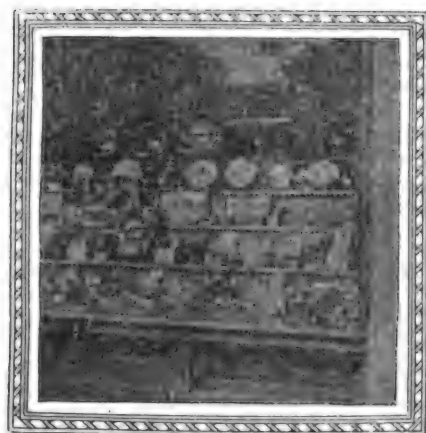
In these days when every householder is trying to mobilize enough coal to keep the furnace going at least Mondays, Wednesdays and Fridays, and getting through with as few shivers as possible Tuesdays, Thursdays, Saturdays and Sundays, many novel methods are employed to coax the fuel to the cellar bins. At least one Providence dweller solved



the problem by hauling the fuel needed to his cellar in the tonneau of his \$5000 car. There is no priority order or papers patent to prevent emulation, but, as the old trapper used to say about a weasel, "the first thing to do is to catch your coal."

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Six employees of the Reo Motor Car Co., Lansing, Mich., recently drove four Reo cars to Chicago, where they were delivered to the branch in that city. After successfully conducting the drive away the men enlisted in the truck section of the Ordnance Department.



Accessories Department



TINOL FLUX.

Every repair man or electrician who has much to do with soldering work realizes that the main difficulty is encountered in removing the soldering flux. If the flux is not carefully removed, in most cases, corrosion of the object will result and the object of the joint lost.

Tinol flux is the result of much experiment and trial and the manufacturers claim that it does not have any eating or corrosive effect on copper, brass, iron, steel or any other metal. They claim that the action is such that the flux, as it evaporates, leaves behind it a thin coating of clean, bright tin, to which the solder takes readily. Another important fact to be considered is that it does not damage fabrics, such as silk or cotton insulation on electric wires.

Manufactured by Hess & Son, Philadelphia, Pa. Two-ounce cans, 25 cents. Trial box, 10 cents.

SYRACUSE FORD LOCK.

A new Ford ignition lock is now being placed on the market which has a novel feature, in that with the lock at "Off" the common contact strip, through which the current must pass in order to get into the coils, is grounded. This the manufacturers claim, absolutely prevents getting a spark to the spark plugs by re-wiring, installing a separate battery, or by any other means without a key.

Another novel feature is the method of connecting the coil box with the steering wheel column in forming the "ground." This is done by the ground plate which, after removing the nuts, is slipped over the two which fasten the coil box and steering column to the dash. When the nuts are again screwed on the bolts they force the turned up portions of the plate into the threads of the bolts, making a permanent ground between the coil box and the car frame. The common contact strip is grounded to the coil box only when the car is locked.

The coils are locked into the coil box by wedging, preventing their removal. With each lock are furnished three nickel plated keys.

Manufactured by Syracuse Universal Manufacturing Co., 320 West Fayette St., Syracuse, N. Y. Price, \$2.50.



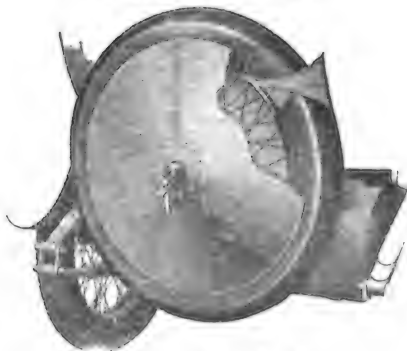
Elgin's Ford Lock.



Auto-Scope Windshield Wipers.
No. 1 and Junior.



Syracuse Ford Lock.



Draver Tire Carrier.

ELGIN'S FORD AUTO LOCK.

The Elgin's lock for Ford cars is an ingenious and simple little device for foiling the would-be thief. It consists of a specially designed lock having a U shaped locking device, similar to a hand cuff. With it the throttle lever and spark advance arm are fastened to the extreme retard position.

With the lock are furnished two keys and it is claimed that there are no two sets of keys alike.

Manufactured by Elgin Motor Power Manufacturing Co., Cedar Rapids, Ia. Price \$2. Special proposition to dealers.

DRAVER TIRE CARRIER.

Tire stealing has become as much of a profession with a certain class of people as the stealing of cars. There is always a great element of chance taken by an automobile thief, while a tire can usually be disposed of with but little trouble and practically no chance of detection.

The Draver Wheel and Tire Carrier consists of two discs, which are mounted on a centre spindle and clamped together with the wheel or tire between them, making a water tight combination in which may be carried spare tubes, etc. The whole device is fitted with a special locking device. The illustration shows how a spare wheel and tire, covered with a leather cover, may be carried on the back of the car. A portion of the outer disc is cut away to show the construction. The device is so arranged that it may be extended to take care of two wheels or tires at a time.

Manufactured by E. R. Draver Manufacturing Co., Richmond, Ind. Write for prices, giving size of wheels or rims.

AUTO-SCOPE WINDSHIELD WIPER.

Something new in the way of a Windshield Wiper is being put on the market under the trade name of Auto-Scope. Acting upon the suggestion that both sides of the windshield become clouded by vapor in damp or foggy weather, the manufacturers designed a wiper that cleans both sides of the glass at the same operation.

The inside wiper is made of heavy absorbent felt, yet not so heavy as to cause undue friction and drag. The outside wiper is made of the best grade squeegee rubber, guaranteed not to scratch the glass.

The whole device may be placed either at the top or between the glass sections of the shield, since it requires but 1/16 of an inch clearance. It is said to operate very easily and exerts an even pressure on both sides of the glass.

It is made in three models: The Auto-Scope Junior with no rear wiping member, finished in black enamel; Auto-Scope No. 1 in oxidized finish for both front and rear of glass, and the Auto-Scope No. 2 designed similar to No. 1, but made of brass and nickel plated.

Manufactured by the White Lock Co., 1241 Michigan Ave., Chicago, Ill. Price, Junior, \$1; No. 1, \$1.50; No. 2, \$2.50.

VELVET RECOIL DEADNER.

A new device has just been placed on the market by the makers of the Velvet Shock Absorbers, and is called the Velvet Recoil Deadner. As the name indicates the device is designed to eliminate or deaden the recoil of the springs on an automobile.

As will be seen by reference to the illustration, the cam A is fastened stationary on the pivot bolt B, while the drum revolves on the bolt. The spring C is fastened to the inside of the drum and when the car goes upward the drum revolves on the pivot and the spring gravels up on cam A, gradually stopping the upthrow of the car. A spring on the opposite side of the device winds back the drum and the spring C immediately slides down on the cam as the body of the car returns to normal position.

Manufactured by the John W. Blackledge Manufacturing Co., 341 East Ohio St., Chicago, Ill. Write for prices, giving name of car.

GEM GREASE AND OIL GUN.

Autoists who dislike to handle grease and oil are prone to neglect lubrication to the certain detriment of the car. A clean and handy method which has no drawbacks is the use of the grease or oil gun, with which grease or oil may be forced into grease cups or small holes without soiling the clothes or hands of the operator.

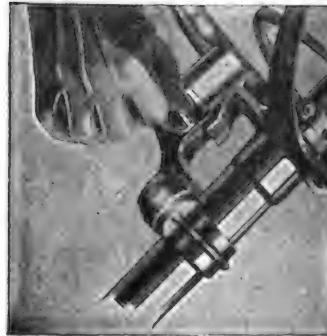
The Gem Grease and Oil Gun is a combination device made from steel, heavily brass plated and fitted with a grease spout, into which a special oil nipple may be inserted if oil is to be used.

The plunger is of compressed cork and held in place upon the feed screw by two heavy steel washers. The feed screw has a black rubber finished iron wheel for turning. The capacity is eight ounces and the barrel measures seven inches long and 1 1/4 inches in diameter.

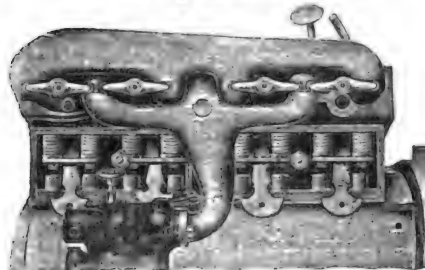
Manufactured by E. Edelmann & Co., 119 West 42nd St., New York, N. Y. Price, \$1.50.



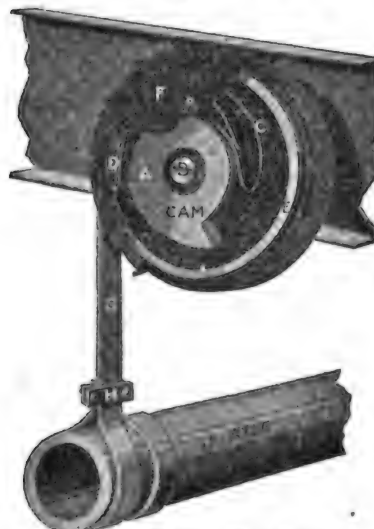
Gem Grease and Oil Gun.



Steering Column Lock.



Valve Spring Compressor.



Velvet Recoil Deadner.



Electric Buffer in Use.

STEERING COLUMN LOCK.

Something radically new in the line of steering column locks is being introduced under the name of the Goodrich Steering Column Lock. This device consists of a three-piece fitting, which fastens to the steering wheel and steering column and locked into place by a Yale lock.

One member of the lock is clamped to the steering column by concealed screws, a second member is fastened to the steering wheel spider by the same means. These two members are left in place permanently, while the third is put into place when it is desired to lock the car. This piece may be carried in the pocket and when in place it is said to be impossible to turn the steering wheel.

Manufactured by Goodrich-Lenhart Manufacturing Co., 418 Widener Bldg., Philadelphia, Pa. Write for prices, stating make of car.

VALVE SPRING COMPRESSOR.

Much of the time spent in grinding valves can be charged off to removing the valve springs. Much more of the time is used in replacing the springs. To eliminate the necessity of removing the springs, for grinding or other repairs, the Warnola Valve Spring Compressor has been designed.

This device consists of a small, flat platform or table, which is cut with slots in which the valve stems fit, and through which the valve keys, pins or split washers are removed. This table is mounted upon a short lever, which is provided with a leg or tongue for prying. The device is slipped over the valve stems, the lever depressed, raising the springs, and the pins or keys removed. The valve may then be taken from the engine, while the compressor remains in place until the valve is replaced, the key inserted and the compressor removed.

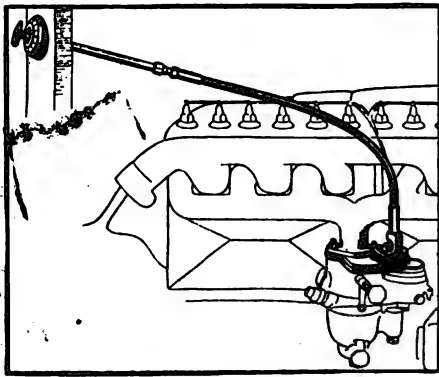
Manufactured by Warnola Manufacturing Co., 73 Wooster St., New York City.

ELECTRIC BUFFER.

The Stow Electric Buffer, originally designed for buffing the bright surfaces of automobiles, has many uses around the shop or garage. The outfit consists of an electric motor, which may be had to operate upon any voltage or cycle, direct or alternating current, direct from a lamp socket; a flexible shaft, clamp spindle and connections; also one 3x1 inch buff and one 4x1 inch buff.

In addition to its usefulness as a buffing device for shining brass and metal work, it may be used with small grinding wheels as well. The small size machine takes wheels up to and including 2 1/4 x 4 1/4 inches, while still heavier machines are made to take wheels up to and including 4 x 4 inches. Proportionately large buffing wheels may be used.

Manufactured by Stow Manufacturing Co., Binghamton, N. Y. Write for prices stating sizes required.



COMCO AUTO LOCK.

Every owner desires to insure himself or herself against the theft of his or her car. The Comco Auto Lock is designed for practically any car and requires no key to unlock it. With this device locked a gas mixture cannot pass from the carburetor to the engine, for a slide valve closes the intake passage entirely. To open it is only necessary to turn the knob on the dash to a prearranged set of numbers, and the valve is opened. More than 250,000 combinations are possible according to the manufacturers, so that the chances of hitting on the proper combination by an unauthorized person are very remote.

For ordinary applications the lock is bolted between the carburetor and intake manifold and forms a part of the equipment. A flexible shaft connects the lock with an indicator dial on the dash, which may be operated in the dark if necessary, once the operator knows the proper combination.

Manufactured by Combination Auto Lock Co., 1134 Chestnut St., St. Louis, Mo. Price, \$10. Ford special, \$7.50.

PEERS AMBU STEAMER.

The American Bureau of Engineering has just put a product on the market



Peers Ambu Battery Steamer.

called the Peers Ambu Battery Steamer, an apparatus for softening the sealing compound on starting and lighting batteries by means of steam, so that the battery may be opened easily and quickly and without the use of gas flame or blow torch. They claim that the use of this apparatus eliminates almost entirely any possibility of damage to any of the delicate parts of a battery, and also guarantees a clean, quick job in removing the sealing compound.

The device consists of three parts: A steam generator, a steam box and a water supply tank. When a battery is to be opened the connectors are first removed and the battery then placed in the steaming box and steam passed into the box for about 15 minutes. This makes the sealing compound soft, so that it can be removed readily with the point of a screw driver, or putty knife, the entire operation of opening the battery being performed within five minutes after it is removed from the steaming box.

The generator or boiler is made of heavy galvanized iron, the water in this unit being automatically kept to a low level so that steam is generated very quickly.

Manufactured by American Bureau of Engineering, 1018 Wabash Ave., Chicago, Ill. Write for prices.

VITRISTONE PRIMING PLUG.

As winter advances the motorist doubtless will find trouble in starting his engine, unless he has a heated garage, or some means of heating the engine. At low temperatures gasoline does not vaporize rapidly and so but little explosive gas gets to the cylinders. The Vitristone Priming Plug may be applied to practically any engine which is not equipped with priming cups and consists of a combination spark plug and priming cup. The design and construction



Vitristone Priming Plug.

are such that by injecting gasoline into the priming cup the gasoline flows directly to the firing points.

The priming cup feature makes the plug self-cleaning, in that the engine may be run on the other cylinders while each cup is opened in succession, thereby forcing out the carbon and cleaning the points.

Marketed by Emil Grossman Manufacturing Co., Bush Terminal building, Brooklyn, N. Y. Price, \$1.50.



SIoux VALVE GRINDER.

The average car owner who grinds his valves but once for every 500 or 600 miles, finds that he is unable to accomplish the job as easily as the repair man who is experienced. He is prone to rotate the valve, and the result is not at all satisfactory.

For the average car owner, as well as the repair man, the Sioux Valve Grinder has been designed. This device consists of a handle or crank operated wheel which drives through suitable gears the grinding tool. The gears are so arranged that by a continuous turn of the crank the tool is given a reciprocating motion, always traveling slightly forward in one direction, then in the opposite, until the whole circumference has been made.

With the tool are furnished three special valve head fittings and a special length of shaft for extension purposes.

Manufactured by Albertson & Co., Sioux City, Ia. Price, \$6.

McQuay-Norris Manufacturing Co., St. Louis, Mo., are putting on the market a new type of ring to be known as the Superoyl, and made in all sizes for use in the upper groove of each piston. It is designed to correct oil troubles and is a concentric ring with an oil reservoir cut into it, at an angle of 45 degrees from the intersection of the cylinder walls and the lower groove bearing face of the ring, providing a scraping edge.

THE WHOLE SPARK PLUG STORY

Delivering the Strongest Possible Spark Continuously the Chief Requisite, Says Mr. Champion*

SPARK plugs have been and are still the greatest cause of trouble to automobile users. Certain failures are self-evident, such as the breakage of the insulators and short circuiting by soot and oil, but these being readily detected do not constitute the real problem.

The average driver has experienced at times an inability to get his motor running uniformly, due to no apparent cause. The carburetor or almost any part of the ignition system is blamed and adjustments thought necessary are accordingly made. The valves are examined, carbon removed and, in fact, effort is made to locate the trouble everywhere except where it actually exists. This sometimes goes on for days and even weeks and finally all other ideas being exhausted the spark plugs are replaced with new ones. Immediately the motor performs better and if the proper plugs have been installed the remedy is, so far, permanent. If, however, the same make of plug or another equally inferior grade has been purchased, the trouble will again commence in a very few weeks.

The reason for this is simply the concealed nature of the plug failure. The plugs having been closely examined and appearing to be perfectly good, the conclusion is reached that they are positively all right and the possibility of their in any way contributing to the poor performance of the motor is definitely set aside. It is just this that leads the average driver astray. The spark plugs have ceased to fulfill their mission, viz:—to deliver the spark—due to porous insulation, and this condition exists with practically all makes of plugs on the market today. Instead of a good, strong spark taking place between the electrodes, most of the current leaks through the insulation and therefore at low speed, and on quick pick up when the mixture is not perfect, the very weak spark remaining will not ignite the gas, resulting in a poorly running motor. This inferior insulation which, it is a fact, is to a greater or less extent a cause of inefficient performance on practically all makes of spark plugs when they are new, increases rapidly with the plugs in use. The porosity of the material permits the absorption of carbon and as it becomes saturated therewith the insulator changes form and the electric leakage increases until there is not enough spark left to ignite the gas. This condition is not discernible to the user not technically informed on the subject and he is at a loss to understand why, although the plugs look all right, they will not fire his engine, whereas the installation



Albert Champion, President Champion Ignition Co., Flint, Mich.

of a new set effects an immediate improvement.

There are a great many different makes of plugs brought out, each having some new feature which generally consists of an ingenious contrivance affixed to the end of the shell or sometimes a special finish or fancy package. These new types are usually sold with liberal guarantees of repair and replacement and are claimed to be the final solution of the spark plug problem. The improvement, featured, however, seldom lies in the basic design working towards a more gas tight plug or in the quality of the insulation which will tend to eliminate the great trouble users have experienced to date with plugs having or developing electric leakage.

Very few of the spark plug manufacturers will point to what their plugs have actually done or are really doing. It is easy to make claims for one's product, anyone looking for a position can readily recite to his prospective employer the great extent of his knowledge and ability to perform certain duties, but a business man, to ascertain the capabilities of an applicant, will first ask for and investigate his references. Likewise, the safest procedure for the buyer of spark plugs is to, before making his purchase, thoroughly investigate records of actual performances of the different makes, relying not on what manufacturers say their plugs will do, but on what somebody else, in a position to know, says that they have done and are doing. The result will justify the care exercised in this regard in the elimination of unnecessary expenditure for new plugs and what is still more important, satisfaction in the purchase existing in a uniformly good motor performance.

Another point which will doubtless be of interest to the readers of "motordom" is the fact (of course we are excepting our own make, as we are dealing with the subject of spark plugs generally) that the plugs made with porcelain insulators for instance are not as good today as they were 10 years ago. At that time all porcelain used for this purpose was imported from France. This porcelain had good thermo dielectric strength; in other words, the leakage through the insulation was very slight and the insulators would not change form. The plugs in the construction of which it was used were good and performed their function until such time as the porcelain cracked or was broken. The automobile business increased and competition became keen and, of course, nearly all spark plug makers were anxious to establish a source of supply in this country, which was very natural, but all they were looking for was a material that would not break or soot too easily and there was produced what appeared to be a good porcelain for spark plug insulators. Later on it was learned what a great deal thermo dielectric strength and "change of form" had to do with the troubles experienced by the users of motors as explained in the first part of this story.

It is one purpose of this article to show how bad spark plugs really are and a consideration of the number of plugs made today as compared with the number of cars in use will impress this fact on the minds of the readers. The total plugs turned out by the different makers annually will equip all cars in use several times, which simply means that each car in operation must use several sets per year. At the same time we have read much advertising in which it is claimed that in the use of a particular type of plug, spark plug trouble is at an end—plugs are guaranteed for the life of the engine, etc.

Of course there will be a good many readers of this article who have driven their car of a particular make for 15,000, 20,000 or 30,000 miles without changing plugs. These are the fortunate ones who have purchased a make of car, the manufacturer of which has realized the importance of spark plugs and without figuring a difference of one or two cents per cylinder on first cost has given his customers, not only a good running motor, but one that will continue to run for a considerable length of time; and, furthermore, he has benefited himself in that he has made satisfied customers. On the other hand, consider the manufacturers who, in saving the one or two cents per cylinder in initial cost, cause the owners of their product to spend dollars per cylinder in trying to get their motors running properly.

The prospective buyer of a motor car will expect to get as good results in the performance of his motor as will have been shown him by the demonstrator making the sale. Therefore, inasmuch as this little spark plug means so much to him, not only in the matter of future expense, but in the running of his motor,

*Paper by Albert Champion, President Champion Ignition Co., Flint, Mich.

It is most expedient that he carefully examine the plug equipment on his engine, before taking delivery, to see that the spark plugs furnished are not only such as may have been widely advertised, but that have also been proven by genuine performances to be of a quality that will insure lasting satisfaction. It is most advisable, in other words, that he demand the make of plug that has shown by actual test to be the best.

"The best is none too good." There is still great improvement to be made in spark plugs in order that the users may get the perfect efficiency which is their due. Nearly every make of spark plug is advertised to be absolutely and positively gas tight; some manufacturers even claim that the compression will help to tighten the plug. At the same time it is a fact that none have been able to deliver, for aviation work, where plugs that do not leak compression are absolutely essential, plugs that are or will remain gas tight. The engineers for the aviation motor manufacturers must certainly find much amusement in the reading of these advertisements, knowing that the very manufacturers whose product is so advertised have failed in their efforts to furnish plugs that would run their particular aviation motor for a given length of time. One of these engineers has remarked that whenever the motors on which he is working start to fail the trouble is immediately attributed to leaky plugs and traced to that source.

The spark plug proposition is a big one: it is a great science and much progress is needed in its development.

Parts Makers Enlarge Plant

FULLER & SONS MFG. CO., Kalamazoo, Mich., makers of automobile parts and specializing in transmissions and clutches, has experienced a steady and healthy growth which has necessitated constant expansion of manufacturing quarters and facilities. With the latest addition to the plant approximately 100,000 square feet of floor space are available for manufacturing purposes.



Plant of the Fuller & Sons Mfg. Co., Kalamazoo, Mich., Makers of Automobile Parts, Specializing Transmissions and Clutches.

Not only is good insulation essential, but also good design. We must have gas tight plugs and as well as the leakage through the insulation existing in present types, there is a surface leakage created by the deposits of carbon on the lower end of the insulation, which must be overcome. We need plugs that will keep clean so that in the cold weather with the inferior grade of gasoline now obtainable and the necessity for a rich mixture it will not be necessary to clean the plugs every day or, in fact, take them out of the engine.

The chief requisite in a spark plug is that it deliver the strongest possible spark continuously and that is the whole spark plug story.

COLUMBUS MOTOR CAR SHOW FEB. 27-MARCH 2.

The annual motor car show of the Columbus Auto Show Co., Columbus, O., will be held in Memorial Hall, in that city, from Feb. 27 to March 2. The show committee consists of Mr. Belt the Franklin dealer; Mr. Bulky, manager of the Ford branch, and Mr. Dobson of the Everett Auto Sales Co., which sells the Maxwell.

IDAHO TAXES CARS BY WEIGHT.

A law has been passed in Idaho providing for a tax on motor cars according to weight. The licenses will be levied as follows: 2000 pounds or less, \$15; between 2000 and 3000 pounds, \$20; between 3000 and 4000 pounds, \$30, and above 4000 pounds, \$40.

The new buildings are constructed of reinforced concrete and are of modern fireproof types. Over 75 per cent. of the sides of the buildings is of steel frame and glass construction, giving a maximum amount of daylight and ventilation. The most modern type of motor driven machinery has been installed and the buildings are heated by forced circulation.

DEERING-MAGNETIC WILL HAVE ENTZ TRANSMISSION.

The Magnetic Motors Corporation has been organized in Chicago to manufacture a passenger car with the Entz electrical transmission. The car will be known as the Deering-Magnetic and will have a Dorris six-cylinder engine. The chassis will also be of Dorris construction, with the exception of the transmission, and the bodies will be designed by Carl H. Martin. There will be three types, a seven-passenger touring car, coupe and sedan, and one of these models will be shown for the first time at the Chicago Salon during the week of the National Automobile Show in that city. Arrangements have been made for the production of 1000 and they will sell for about \$4000 each.

The Magnetic Motors Corporation is a combination of the Rauch & Lang-Baker Co. and Owen Magnetic Motor Car Co., both of Chicago. The former has been distributor of the R. & L. in that territory and the latter has distributed Owen-Magnetics. The officers of the company are: R. S. Deering, W. G. Pancoast and Paul A. Frank.

QUAKER CITY MOTOR CLUB HOLDS ANNUAL ELECTION.

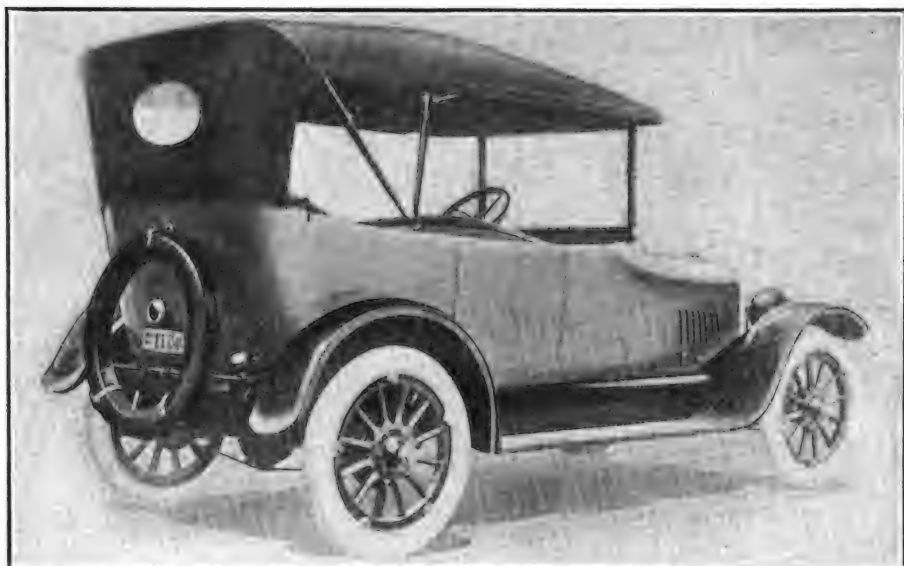
The Quaker City Motor Club of Philadelphia recently held its annual election at which the officers for the ensuing year were named as follows: President, Paul B. Huyette; first vice president, G. Douglas Bartlett; second vice president, J. R. Overpeck; treasurer, Ralph L. Murray; secretary, W. E. Stagg; board of governors, Frank Hardart, P. D. Folwell, T. F. Seifert, William J. Ferguson, George G. Meade, Charles L. Hower, L. D. Berger, U. T. Shoemaker and George E. Potts.

The following chairmen of committees were appointed: Contest and auditing, P. D. Folwell; routes and tours, J. R. Overpeck; pathfinder and pilot, George E. Potts; law ordinance and good roads, G. Douglas Bartlett; membership, I. T. Shoemaker; house, George G. Meade.

HYDRAULIC GEAR SHIFT WILL BE MANUFACTURED.

The United States Gear Shift Co. has been formed at Eau Claire, Wis., with an authorized capital of \$1,500,000, to manufacture a hydraulic gear shifting device which does away with the gear shift lever and can be installed on any passenger car or truck except the Ford.

L. A. Laursen, a hydraulic engineer, is the inventor of the device. It weighs about 16 pounds and can be manufactured to sell for about \$55. Its operation is mainly automatic and is controlled by an indicator lever located under the steering wheel on the post. This lever is placed at the desired gear position and the clutch pedal thrown out when the change is made by the device.



Regal Four-Cylinder, Five-Passenger Touring Car, and Attractive 1918 Light Car Model.

Details of Regal Hi-Power Four

Factory-Built Engine, New Spring Suspension
and Refinements Maintain Light Car's Prestige

WITH a fixed policy of being always abreast of and usually ahead of the popular demand, the Regal Motor Car Co. of Detroit, Mich., presents a car in 1918, in its 12th season, that through the entire list of automobile conveniences and refinements stands out noticeably in its class. With full belief in the dictum that any light car is best equipped with a four-cylinder motor, the Regal engineers maintain prestige for their popular product with the powerful engine they have developed on this basis.

In 1907, when Fred W. Haines, a Detroit engineer, brought out the plans and specifications of this car, it was the determination to present a large car of exceptional quality and comfort at a moderate price which actuated the enterprise. Steady progress has been marked in the Regal product. As fast as new eras in automobile engineering developed new methods of construction and conveniences of equipment they were incorporated. The genuine cantilever rear spring appeared early in their models, so did the streamline effects and other current refinements. In a high cost era the Regal is maintained as a sturdy four-cylinder model in a class that is more than usually interesting in its members and make up to a large body of motorists who have something of foresight of what car ownership may mean to their keenest interests before the season is through.

The 1918 Regal Hi-Power Four, as it is called, is a five-passenger touring car of streamline design, having high rolling sides and a narrow, high radiator, at a

price of \$795. The body is long and roomy and finished in soft, deep upholstery, stuffed with curled hair. The rear seat measures 48 inches in width and the front 42, giving room for five persons without crowding.

The unit power plant is extremely neat and all units are accessible for repairs and adjustments. The engine is a four-cylinder, with cylinders cast in block, having a bore of $3\frac{1}{4}$ and a stroke of $4\frac{1}{4}$ inches, giving a horsepower of 19.60 S. A. E. formula. To facilitate the removal of carbon and render the valves accessible for repairs the cylinder head is removable and fitted with large water circulating space. Made of close grained gray iron, the pistons are fitted with three eccentric rings and oil grooves on each.

The crank case is made in two sections, the upper part, which carries the crankshaft and camshaft is cast integral with the cylinder block, while the lower comprises the oil base and is easily removable for repairs to the inside of the engine. Both sections extend beyond the flywheel, forming a large bell housing surrounding that unit. Mounted on three die cast nickel babbitt bearings the drop forged crankshaft is amply large

to withstand the strains to which it is put. The journals are $1\frac{1}{8}$ inches in diameter, and front, centre and rear measure $2\frac{1}{8}$, $2\frac{1}{4}$ and $3\frac{1}{4}$ inches in length respectively.

Nickel babbitt, die cast, is also used for the connecting rod bearings, which measure $1\frac{9}{16}$ inches in diameter by $1\frac{1}{8}$ inches in length. Phosphor bronze bearings, $\frac{3}{4}$ by $1\frac{9}{16}$ inches, are used at the wrist pin end of the connecting rods. The rods themselves are of I beam section drop forged and of great strength.

The camshaft is mounted on three bearings and made of one piece, the cams being drop forged integral with the shaft. Helical cut timing gears one inch wide furnish the drive for the camshaft.

All valves are enclosed by metal covers, which are easily removed for adjustment, and interchangeable. Attention is called to the gas opening, for with the valve open the lift is $1\frac{1}{4}$ inches, while the clear opening is $1\frac{9}{16}$ inches.

Lubrication is had by a plunger pump, operated from the camshaft and carrying oil to the splash pans, located beneath each connecting rod. The oil base capacity is four quarts and fitted with a float indicator gauge on the side of the crank case.

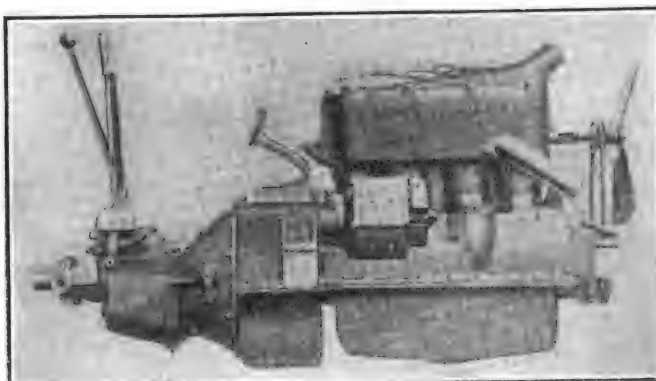
The cooling system is thermo syphon through a large honeycomb radiator, the circulation of air being promoted by a three-blade, 16-inch fan, which is driven by belt from a pulley mounted on the crankshaft.

A vacuum tank draws gasoline from a 14-gallon tank mounted at the rear of the car and supplies the automatic type carburetor, which is mounted close to the cylinders to prevent condensation, with fuel.

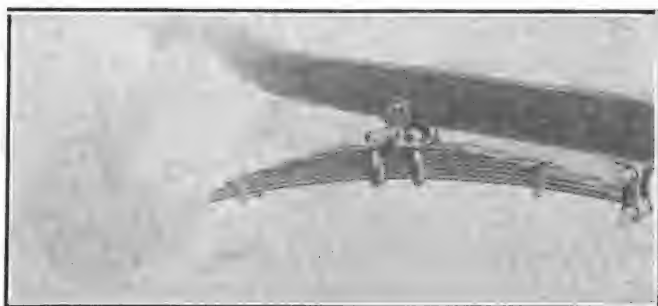
The ignition unit, which is of the high-tension distributor type, is mounted on the generator and takes current from the storage battery. Mounted integral with the distributor is the breaker box.

The power plant, consisting of the engine, clutch and transmission gearset, is supported in the chassis at four points by heavy cross members cast into the upper part of the crank case, thus eliminating all chance for power plant distortion by frame flexion.

From the engine power is transmitted



Factory-Built Engine of the Regal, a Neat Power Unit with Parts Readily Accessible.



Cantilever Rear Spring of the Regal, Hung Directly Beneath the Frame.

to the gearset through a leather faced cone clutch, which is fitted with spring inserts under the facing for gradual engagement. An improved ball bearing throwout insures smooth clutch action.

The transmission is of the selective, sliding gear type, and has three speeds forward and reverse. The gears and shafts are nickel steel alloy, heat treated; the main shaft being mounted on ball bearings, while the jackshaft is mounted on plain bearings.

Through the enclosed propeller shaft the power is carried to the full floating rear axle, which is fitted with roller bearings throughout. Torston and drive is taken by the propeller shaft enclosure, which is mounted on a swivel joint at the transmission.

A wide yoke, I beam, drop forged, and of exceptional strength, forms the front axle, upon which the wheels are mounted on adjustable bearings. The springs are semi-elliptic in front and cantilever in the rear.

Second growth hickory is used for the wheels, which are fitted with 12 spokes each, and demountable rims with 30 by 3½-inch tires at both front and rear, the latter being of the non-skid type.

A worm and gear type, irreversible steering gear, fitted with a 17-inch steering wheel, is mounted on the left side, while the gearshift control and emergency levers are mounted in the centre.

Both the emergency and service brakes operate on drums on the rear

Blue body and wheels with black enameled hood, fenders and radiator is standard body finish, which with the dark gray mohair top makes an attractive car. With the standard equipment is furnished an electric horn, robe rail, speedometer and battery indicator, rain-vision ventilating windshield, an extra rim with tire holder mounted on rear of car, complete set of tools and a tire repair outfit.

Liberty Trains Show U.S. Army Trucks Mettle

Overland Delivery by Their Own Power
Triumphs Over Extra Severe
Road Test.

Six more U. S. army truck trains, each consisting of 30 Packards, will leave Detroit in a few days en route to the seaboard. At almost the exact time the first army train was rolling into Baltimore on Dec. 28, completing the journey overland from Detroit, the government gave the Packard factory unofficial notice to prepare 180 more three-ton and six-ton carriers for immediate travel under their own power.

As fast as the drivers, cooks, mechanics and other men of the personnel ar-

wheels. A two-unit starting and lighting system is used, which also combines with it the ignition system. The generator is driven by a gear, direct from camshaft, and the current is stored in a 80 ampere-hour six-volt battery. The starting motor operates through a Bendix drive on the flywheel.

rive from army cantonments and training camps the trains are made up and sent away.

On the first trip completed the trucks made an average run of 48 miles a day for 11 days over snow filled and ice covered roads. At times they plowed through drifts six feet deep. In Pittsburgh 200,000 people turned out to see the trucks enter the Steel City.

Commenting on the initial trip, officials say it has shown that army trucks can make better time to the seaboard under their own power than they can by rail in present traffic conditions. Another big advantage of the drive away is the training of drivers, escorts and train masters for transport service over seas.

BIG CLOSING QUARTER OF 1917 FOR JORDAN COMPANY.

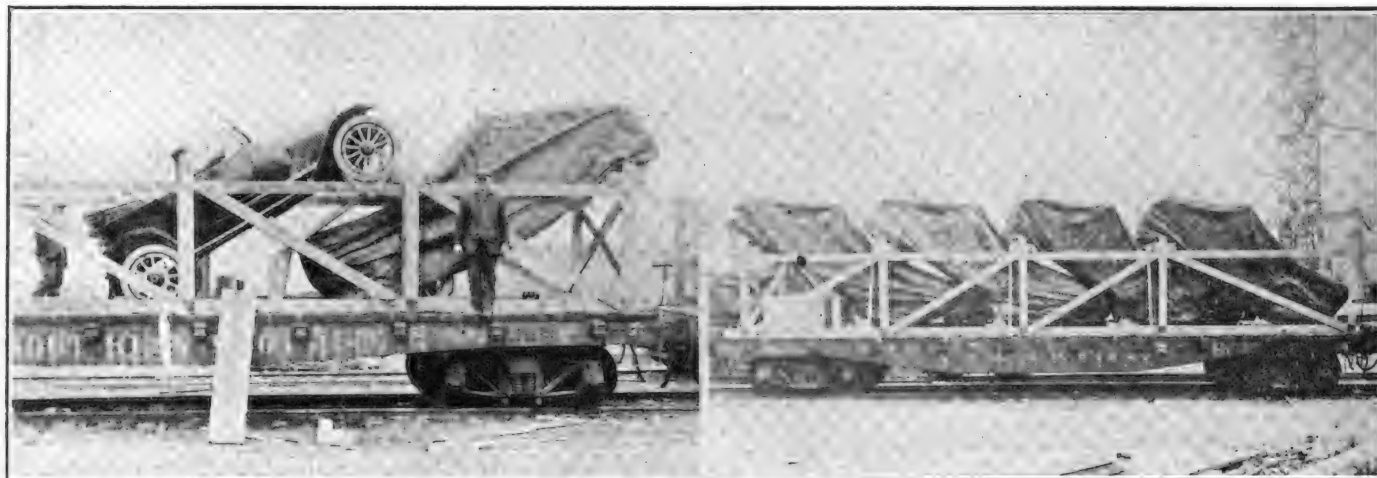
The Jordan Motor Car Co., Cleveland, O., for the three months ending Jan. 1, reports an increase of 30 per cent. in gross sales, as compared with the corresponding period last year. This period, which is looked upon as the dulllest in the automobile year, the sales of Jordan cars and parts totaled \$590,826, on which a net profit of \$50,302 was realized. Sales of Jordan cars totaled \$571,232 during the period and parts \$19,593.

The statement of profit and loss for the period is as follows:

Net car sales.....	\$571,232.98
Net parts sales.....	19,593.57
Total sales.....	\$590,826.55
Cost of cars.....	\$500,746.63
Cost of parts.....	14,446.51
Advertising	17,350.00
Running expenses...	13,720.40
Sundry expenses....	2,019.12
Total.....	\$548,282.66
Less cash discount on purchases	\$7,758.66
Total cost of doing business..	540,524.00
Net profit.....	50,302.55
Total.....	\$590,826.55



Portion of the First Train of Packard Machines on the Way from Detroit to an Atlantic Seaport, a Pathfinder's Tour Which Determined the Government Upon Deliveries of Army Trucks by Their Own Power.



Rarest of Visitors to an Automobile Plant Is the Automobile Freight Car Made Especially Some Years Ago for the Transportation of Motor Vehicles, Hence the Olds Motor Works Adopts an Upright Packing Plan on Open Flats.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Olds Motor Works, Lansing, Mich., takes a flat car and builds a heavy frame work around it about six feet high of 6x6 timbers. There are heavy cross members at the top of this frame into which the front wheels of the automobile rest while the hind wheels rest on the floor and carry most of the weight. The car is then loaded under its own power, being driven up on skids at almost a 40-degree grade. When the front wheels drop into place the car rests at an angle of about 33 degrees. It is then securely anchored and covered with heavy canvas. The traffic department devised this expedient, as the rarest visitor to automobile plants these days is the automobile freight car that was built especially to handle automobiles.

The Torbensen Axle Co., Cleveland, O., has taken out insurance policies covering all its employees. The insurance is paid to the beneficiaries of the employees immediately upon death and is without cost to them. Men in the employ of the company for less than six months are covered with a \$250 policy; over six months, \$500; over a year, \$600. An additional \$100 is added for each year of service up to a maximum of \$1500.

The Mohawk Rubber Co., Akron, O., has opened a distributing branch in San Francisco to handle the Pacific Coast trade. The branch, which is located at 1436 Van Ness avenue, will be in charge of George R. Cowden.

Joseph Berg, formerly chief engineer of the Stewart-Warner Speedometer Corporation, Chicago, has joined the Champion Ignition Co., Flint, Mich.

Holley Bros., Detroit, Mich., have organized a new company known as the Holley Kerosene Carburetor Co., with

\$100,000 capital, to handle the business of manufacturing and selling kerosene carburetors. The incorporators are: George M. Holley, Earl Holley and M. A. Cryderman.

The Templar Motors Corporation, Cleveland, O., which was organized last year and erected a new factory, has already outgrown its plant and additional manufacturing space will be provided with the erection of a new factory building 64x300 feet.

The Empire Tire and Rubber Co., Trenton, N. J., has elected three of the organization staff to the directorate and also distributed 500 shares of stock to 56 employees as a bonus. The three new directors are: John E. Frazer, mechanical engineer of New York City; W. W. Saunders, chemist, Akron, O., and C. Edward Murray, Jr., factory superintendent. It is estimated that the company's earnings for the past year will total \$400,000, the shipments during the period having increased 100 per cent. The new plant is nearly ready for occupancy and will have a capacity of 2500 tires and 2500 tubes daily.

The Westinghouse Electric and Manufacturing Co. has declared the regularly quarterly dividend of 1½ per cent. on its preferred stock payable on Jan. 15 to stockholders of record Dec. 31. A similar dividend on the common stock will be paid to stockholders Jan. 31.

The Bittel-Leftwich Co., St. Louis, Mo., with branches at Webster Groves, Mo.; Decatur, Ill., and Springfield, Ill., will also establish branches at Kansas City, Mo., and Little Rock, Ark. The company handles accessories and Dreadnaught tires.

The Silvex Co., Bethlehem, Pa., makers of Bethlehem spark plugs, are installing 30 new Gridley automatic machines in

their new plant, which together with the old machines will make possible a daily production of 50,000 plugs when in full operation.

The Westcott Motor Car Co., Springfield, O., has declared the regular quarterly dividend of seven per cent. on the preferred stock, payable to stockholders of record on Dec. 28.

The Hydraulic Pressed Steel Co., Cleveland, O., has increased its authorized capitalization from \$5,700,000 to \$7,200,000.

The Smith Motor Truck Corporation has elected five new directors, all of whom were members of the creditors' committee appointed last fall when a six months' extension of credit was granted the company. The new directors are: Prentiss L. Conley, vice president of the Link Belt Co., Chicago; C. E. Danforth of Van Emburgh & Atterbury, New York City; W. R. Dawes, vice president of the Central Trust Co., Chicago; O. J. Fechling, manager National Malleable Castings Co., Chicago; David R. Forgan, president of the National City Bank, Chicago. The other directors are: D. W. Figgis, J. M. Hoyt, C. B. Little and J. L. Putnam. Officers of the company are: President, D. W. Figgis; vice president, B. E. Veatch; secretary, L. A. Stebbins; treasurer, C. R. Hammer.

The Liberty Ignition Co. has purchased a factory at 10 Hyden street, Springfield, Mass., and will install machinery for the manufacture of spark plugs.

The Auto Wheel Co., Lansing, Mich., made a profit of about 20 per cent. on its \$300,000 capital stock for the year ending Oct. 10, 1917.

Frank A. Storer and Joseph Musgrove were elected directors of the Wire Wheel Corporation of America, Buffalo, N. Y., at the annual meeting of the



Branch Managers of the Sewell Cushion Wheel Co. in Convention Recently at the New Factory, Detroit, Mich. Standing: Left to Right, George F. Willis, St. Louis; C. E. Putnam, Minneapolis; Norton Monsarrat, Columbus, O.; George Miller, Philadelphia; R. F. Cleary, Newark, N. J.; O. H. Jones, Baltimore; George L. Allen, Manager of Factory; S. G. Snider, Louisville; E. H. Milliken, Manager New England Branch; J. F. Thompson, New York; C. H. Shaw, Credit Manager; George Mason, Cleveland, O.; Ted Snider, Cincinnati; I. L. Johnson, Toledo. Sitting, Left to Right: E. G. Burley, Pittsburgh; Alfred W. Sewell, Buffalo; Chester H. Tilden, Detroit; D. H. Tiffany, Rochester; James C. Sallee, Advertising Manager; J. H. Hammes, Vice President; H. J. Sewell, President; Walter T. Sewell, Treasurer; Fred E. Boylan, Sales Manager; W. E. Chapman, Chicago; Fred E. Grant, Detroit.

stockholders. The other members of the directorate were re-elected.

The Mixrite Carburetor Co., Decatur, Ill., will increase its capital stock from \$30,000 to \$75,000. At the meeting when the stockholders authorized the increase, two new directors were elected, Volney Mount of Marshall, Ill., and M. E. Hornback of Decatur. Officers for the ensuing year were elected as follows: President, W. E. Coombe; vice president, A. A. Granger, and treasurer, E. H. Williams.

The Elgin Motor Car Corporation, Chicago, Ill., will be represented in the South by C. H. Bassett as sales manager of the southern zone. Mr. Bassett is one of the best known salesmen in the industry, having been connected at different times with the Studebaker, Selden, Buick and other companies.

The King Motor Car Co., Detroit, Mich., has announced a new price schedule for the eight-cylinder King product. The seven-passenger touring car or three-passenger roadster will sell at \$2150, the four-passenger foursome at \$2350, and the seven-passenger convertible sedan at \$2950. Wire wheels are extra on all cars except the foursome, which also comes equipped with 32x4½-inch cord tires.

The Prest-O-Lite Co., Inc., has appointed the following firms and individuals as distributors of acetylene products: Patchogue Garage Co., Inc., Main St., Patchogue, L. I., N. Y.; Russell Haws, High and Adams Sts., Pottstown, Pa.; Western Motor Car Co., Holdrege, Neb.; Midway Motor Co., 25th and First Ave., Kearney, Neb.; Mark Guy, 25 Main St., Asbury Park, N. J.; Weingarten-Healing Co., 730 Broadway, Bayonne, N. J.; Esslinger & Brown, 508 Market St., Camden, N. J.; Van Dusen's Garage, Passaic St. and Railroad Ave., Hackensack, N. J.; Hudson County Auto Supply Co., 683

Montgomery St., Jersey City, N. J.; Maurice River and Transportation Co., 225 High St., Millville, N. J.; Newark Storage Battery Co., 445 Central Ave., Newark, N. J.; Hart Motor Car Co., 147 Main Ave., Passaic, N. J. The following battery service stations have been appointed by the company: Carter Electric Co., 200 W. Superior St., Kokomo, Ind.; McCincohy & Guy, 120 Mulberry St., Muncie, Ind.; Weiser Electric Supply Co., Weiser, Ida.; Gooding Motor Co., Gooding, Ida.; Emmett Garage and Auto Co., Emmett, Ida.; East Hollywood Garage, 4715 Hollywood Blvd., Los Angeles, Cal.; Delco Service Station, 1330 S. Flower St., Los Angeles, Cal.; The Hugo Auto Co., N. "A" and Wade Sts., Hugo, Okla.; North Texas Battery Co., 712-14 Eighth St., Wichita Falls, Tex.; Central Garage, 242 West St., Healdsburg, Cal.; F. W. Turner, Willard and Second Ave., East Dickinson, N. D.; Wall Street Garage, 637 Wall St., Los Angeles, Cal.; Olcott & Reed, Fulton, Ky.; R. G. Fisher Electric Co., P. O. Building, Donora, Pa.

The Texas Motor Car Association has been organized in Texas to manufacture a passenger car to be the "Texan." The present plan of operation calls for the erection of a plant at Fort Worth, Tex., to employ 500 men and to have a daily production of 20 cars. The Texan will sell for about \$850. It is also proposed to make a line of trucks and tractors.

The Paige Motor Car Co., Detroit, Mich., has developed a new two-ton truck, which will be manufactured in addition to its line of passenger cars. The plant of the Williams pickle factory in that city has been acquired and will be renovated and equipped for the manufacture of the trucks.

C. T. Dunkle has organized the Overland-Dunkle company with an authorized

capital of \$100,000 to take over the sales of Overland cars in the Central Ohio territory. He was formerly manager of the Columbus branch of the Willys-Overland company.

Thomas Zimmerman has been appointed head of the axle engineering department of the Standard Parts Co. of Cleveland, O. He was formerly mechanical engineer of the United States Light and Heat Corporation, Niagara Falls, N. Y., and prior to that occupation was engineer with the Abbott Motor Co.

The Warner Gear Co., Muncie, Ind., is erecting a new brick and steel plant, 136x450 feet, with wings, which provides an additional floor area for manufacturing purposes of 60,000 square feet. The new structure will be in operation within 60 days.

The Jenkins Motor Car Co.'s plant at Rochester, N. Y., has been sold to the Clark Novelty Co. of that city.

The General Motors Corporation for the four months ending Nov. 30, 1917, earned undivided profits of \$12,900,000, as compared with \$8,993,633 in the corresponding period of 1916, or an increase of \$3,906,367. Allowing for proportionate preferred dividends, but not for war taxes, the earnings are equal to 15.1 per cent. on the \$82,500,000 common stock outstanding for the four months' period. Sales for the period totaled 72,923 cars and trucks, as against 52,868 in the corresponding period last year, and the net sales for the period were \$74,868,000, against \$48,383,997 last year during the four months. Cash in the bank at the end of the period and sight drafts with documents attached as of Dec. 18, 1917, amounted to \$23,530,000.

Victor W. Kliesrath has acquired an interest in the Simms Magneto Co., East Orange, N. J., and has become consulting engineer for the concern. He held the position of chief engineer of the Bosch Magneto Co. for many years.

R. M. Hernandez, for 10 years with the United States Tire company, has been appointed manager of the central district for the Carlisle Cord Tire Co. of New York City, with headquarters in Chicago.

The Gillette Motors Co., Mishawaka, Ind., has been sold to M. W. Mix, head of the Dodge Manufacturing Co. The company was formed in July, 1916, to take over the business of the Wilmo Co., Chicago, Ill. The sale price is reported as \$151,000.

The Lang Body Co., Cleveland, O., will start manufacturing operations in its new plant about the first of February. The plant, which occupies a five-acre site on a switch of the New York Central road, is three stories in height and of mill construction. The officers of the company are: President and treasurer, Charles E. J. Lang; vice president and general manager, Elmer J. Lang; secretary, John H. Price.

The Reo Motor Car Co., Lansing, Mich., is shipping from 125 to 150 cars a day. Some of the cars are being driven overland, while others are being stored by dealers pending a let up in the congested freight car situation.



Enlarged Plant of the Wagner Axle Co., Anderson, Ind., Makers of Liberty Axles, Working on an Extensive Production Schedule.

The Goodyear Tire and Rubber Co. has started shipping cotton from its plantation in Arizona to its fabric mills at Goodyear, Conn., where it will be used in the manufacture of tire fabrics. During the past season a total of 6000 acres out of a total of 26,000 acres was under cultivation and this year it is planned to greatly increase the production.

The W. S. Seaman Co., Milwaukee, Wis., manufacturers of closed car bodies, has increased its capital stock from \$50,000 to \$150,000.

The Mason Tire and Rubber Co., Kent, O., recently unfurled a large service flag at its plant, the raising being observed with a full ceremony same as employed at the military posts. Employees of the company are in practically every branch of the service.

The Sterling Motor Car Co., Brockton, Mass., is building an addition to its factory in that city. It is of mill construction, 100x100, one and two stories in height and will cost about \$10,000.

The Saxon Motor Car Corporation, Detroit, Mich., expects to complete its new plant within 60 to 90 days. Over 300 men are working on the various factory units. The main unit is a structure 1260 feet long by 240 feet wide, with a floor space of 400,000 square feet.

The National Hearse and Motor Co., Grand Rapids, Mich., reports an increase in business of 100 per cent. for 1918, as compared with last year. The company is issuing \$100,000 of seven per cent. stock to finance the expansion necessary to meet the demand.

The Studebaker Corporation, South Bend, Ind., will erect a new dry kiln to cost \$50,000. The structure will be 112x244 feet, one story in height.

The Columbus Varnish Co., Columbus, O., makers of the "Peerless" line of automobile specialties, have announced to the trade that their 1918 window display material, containing six pieces to the set, such as signs, hangers and streamers, is ready for distribution to accessory jobbers, dealers and garages, as well as hardware stores. This material, which is free to all dealers carrying the "Peerless" line, will be sent upon request to those who have not received it.

The Staybestos Manufacturing Co., Philadelphia, Pa., have opened offices in Detroit and Chicago. In the former city the office will be in charge of W. C. Du Comb, Jr., and will be located in the Kerr building. The Chicago offices at 608 S. Dearborn street will be in charge of Edwin E. Coith.

Earl W. McGookin of Detroit has been

appointed state representative of the Tillotson carburetor in Michigan and will also cover the city of Cleveland, O.

The Abbott Corporation, Cleveland, O., has been cited on an involuntary petition in bankruptcy. It is understood that the plant has temporarily suspended operations, but that the contemplated merger with the Hal Motor Co. will be carried out as planned when the financial difficulties are settled.

The Barnes Foundry and Manufacturing Co., Detroit, Mich., which was organized last summer by Claire L. Barnes with a capital of \$2,000,000 to make cylinders, pistons and other gray iron castings, will dispose of its real estate holdings and abandon plans for erecting a plant. This action was decided upon owing to war developments and as there is an opportunity to liquidate at 100 cents on the dollar, due to the enhanced value of the 34 acre plant site owned by the company, which is located on the Detroit river next to the Great Lakes shipbuilding plant.

The General Motors and Chevrolet companies at a joint meeting of the directors held in New York last week took no definite action on the proposed merger of the two companies and they will continue to operate independently. It was also stated by directors of both companies that there was no immediate intention of consolidating.

The Nash Motors Corporation has de-

clared an initial dividend of \$6 a share on the common stock, payable Feb. 1 to stockholders of record Jan. 19. A regular quarterly dividend of 1½ per cent. has been declared on the preferred stock.

A. J. Picard & Co., Inc., one of the largest and oldest automobile accessory jobbing and distributing houses in the country, who started business in a small way at 1720 Broadway, New York City, many years ago, will discontinue their retail store at 1700 Broadway and in the future do a wholesale business exclusively, with headquarters in their new building, 61st street and Broadway. The head of the company, A. J. Picard, has been identified with the motor car industry for 20 years and is the dean of the dealers, having been a representative for the Darracq, a French make, which was sold in this country when motor cars were a curiosity. The company is distributor in the East for the Stromberg carburetor, Gabriel snubber, Apollo Rubber Co. and national distributors of the Genemotor starting and lighting system for Ford cars, manufactured by the General Electric Co.

Edward S. Jordan, president of the Jordan Motor Car Co., entertained representatives of every parts and equipment manufacturer whose unit was chosen for the Jordan Sport Marine car, which made its debut at the New York National Automobile Show. The men who came to the show to see the new Jordan creation were: F. C. Gilbert of the Timken Detroit Axle Co., G. W. Yeoman of the Continental Motors Corporation, Joseph Bijur of the Bijur Motor Lighting Co., O. L. Harrison of the Delco Co., W. L. O'Neill of the Stromberg Motor Devices Co., G. W. Wilder of the Gemmer Manufacturing Co., H. B. Smith of the Steward-Warner Co., F. E. Castle of the Hayes Wire Wheel Co., William H. Ankam of the C. M. Hall Co., G. M. Mather of the Mather Spring Co. and William Sparks of the Sparks Withington Co.



View of the Exhibit of the Edward V. Hartford, Inc., at the Grand Central Palace Auto Show, Accessories Section.

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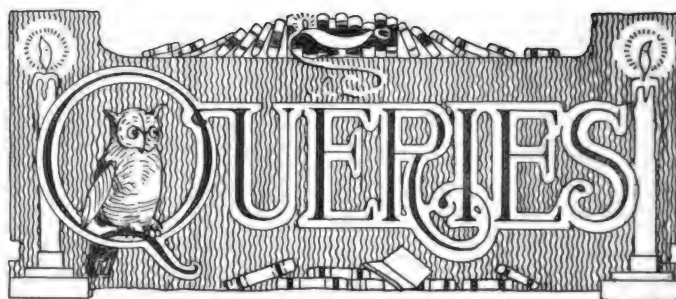
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money that otherwise would be spent with a garage man. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

HOW DO YOU KEEP THE OILING SYSTEM OF YOUR ENGINE EFFICIENT AND WHAT ATTENTION DO YOU GIVE IT?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 5th of February. The contest is open to every one.

That our readers and contributors realize the importance of proper tire storage during the winter months, when the car is out of commission, is evidenced in many letters received in answer to the last question propounded in the Idea Exchange. Under certain conditions a tire will depreciate fully as fast in the winter, even if not used on the car, as it does in the summer, while it is being used. Heat, oil and water have a tendency to break down either the rubber or the fabric to such an extent that when the tire is put back for spring driving it quickly goes to pieces.—Editor.

PAINTING TIRES FOR WINTER STORAGE.

(H. R. Fish, Madison, Wis.)

Best Letter.

Let me give you my method for taking care of my tires during the winter months when the car is out of commission.

As soon as the car is stored for the winter the wheels should be supported free from the floor and the rims removed. The tires should be removed and the rims cleaned and given a coat of graphite to prevent rust from forming and destroying the tires.


All small cuts and stone bruises should then be vulcanized or repaired and the beads of the tires given a coat of graphite. The tubes should then be inserted, the tires put back on the rims and then pumped to about 30 pounds pressure, simply to keep a tension on the tubes and prevent wrinkles from forming. A pressure test should be made about every 30 days and the tires brought up to pressure if necessary.

After the tires have been inflated the surface should be cleaned and dried and given a coat of white tire paint, extending over the entire surface and right up to the rim. This

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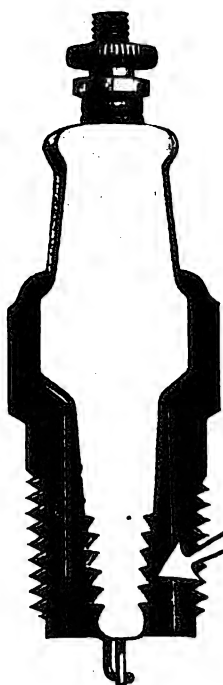
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The Reason

A deposit of carbon on the smooth surface of the porcelain is what causes short circuit with ordinary plugs. With the AC Carbon Proof plug the porcelain is provided with a number of ribs having saw tooth edges which attain a sufficiently high degree of heat to burn away the carbon. This keeps the edges free from deposits and breaks up any possible short circuit.



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and Studebakers

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paint is composed of ground rubber and lithophone (a zinc by-product) thinned with benzine. This keeps the light and air away from the rubber so that it will not deteriorate. The paint dries fairly hard, but when the tires are again put in use it will practically all wear off in a short time, leaving the rubber clean except next to the rim.

This same treatment should be given the spare tire, for when this tire is painted it will not be affected by water or ordinary wear. I have just had occasion to take off a new tire from the holder at the rear of my car which has been there for six months, and have scraped off the paint to see what effect it had on the rubber. I found that the rubber is just as soft and pliable as the day the tire was received.

My tires are kept on a rack in the basement, which is cool and dry and where they can be tested frequently. This has been my system for a number of years and I am more than pleased with the results which are shown in tire mileage.

WRAPPING TIRES FOR THE WINTER.

(H. D. Hoch, Lyon Station, Pa.)

(Second Best Letter.)

Where a car is to be stored for a long time it should be jacked up so that the weight will not rest on the tires. The air pressure should be reduced to about half that of normal and kept away from the light and moisture. Strips of carpet or dark paper wound around the tires keep away both light and moisture and this should be done in all cases where they are to be left many weeks.

During the spare time in winter all of the cuts should be vulcanized or repaired. Wash the cuts with gasoline, cut away the rotted rubber and apply at least two coats of cement, allowing the first to dry before the second is applied. The cut should then be filled with raw rubber and the vulcanizer applied for 20 minutes. All rust should be kept from the rim, and plenty of soapstone used inside the shoes during the winter.

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CHARGING A STORAGE BATTERY.

(J. G. M., Westport, Conn.)

Will you kindly give me directions for charging two six-volt, 120 ampere-hour batteries from a 110 volt generator having an output of 16 amperes? Can I use the whole 16 amperes for charging the batteries?

As a general rule the batteries are marked with the starting and finishing rates of charge in amperes. The starting rate of charge should never exceed one-eighth of the total ampere-hour capacity of the battery, while the finishing rate is usually about one-third the starting rate. This applies to a 12-hour charge.

If you are charging the batteries yourself and have a constant source of power, we would suggest that you charge them at the finishing or 24-hour rate, which should be approximately six amperes. Under no conditions should you load the whole output of the 110 volt 16 ampere generator upon the batteries at one time.

For charging under the 24 hour rate, six 32 candlepower carbon filament lights should be connected in the circuit in parallel arrangement. From the positive pole of the generator run a wire to one pole of a double throw switch, and connect the corresponding pole of the switch with the positive pole of the storage battery, connect the two batteries in series, that is, the positive of one with the negative of the other.

From the negative pole of the second battery run a wire to one side of six light sockets, and from the other side of the light sockets run a wire through the switch to the negative terminal of the generator. As the lights are put into place the amount of current passing into the battery can be increased at will.

Turn on the switch after the generator has been started and allow the batteries to charge on the six amperes until a voltage reading fails to show a voltage rise over a period of one-half an hour. At no time should the temperature of the electrolyte rise above 100 degrees. If it does, one or two of

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the light globes should be removed until the temperature drops.

If it is desired to charge the battery at a higher rate you may add one 32 candle power light for each additional ampere desired. If the charging rate is to be 10 amperes the total number of lights will be 10. The current is allowed to pass through the 10 lights until the battery gases freely and the temperature of the electrolyte commences to rise, then the number of lights should be decreased until the finishing rate of six amperes is reached. The rise of voltage will be gradual until the peak of voltage has been reached. At this point the voltage will remain stationary for at least half an hour. The charging should then be stopped.

KNOCK IN FORD CAR.

(J. A. S., Rochester, N. Y.)

I am having considerable trouble with my Ford 1917 car. When I run the car up a hill I frequently notice a puff of smoke, then a continued pound which I cannot stop, even by retarding the spark. I have had the carbon cleaned from the cylinders and am now grinding the valves. Can you tell me a possible reason for the pound or knock? What is the valve setting on this engine?

There are quite a number of possibilities for the trouble with your Ford car. First, examine the gasket between the cylinder head and block; in fact, we would advise you to install a new one, liberally covered with a paste of graphite and oil. This is to prevent water leakage from the jackets into the cylinders. Under ordinary conditions this leakage may not be noticeable, but at high engine speeds or under pressure there may be a leakage of water into the cylinders. If the leak is large it would fully account for the knock which you notice.

Make a careful examination of the valve setting. Be sure that the clearance between the tappet or push rod and valve stem is not more than $1/32$ nor less than $1/64$ of an inch. The correct clearance should be about $3/32$ of an inch when the

engine is cold. This is very important.

The writer has been called to inspect a Ford machine which developed a peculiar knock and found that the spark plug electrodes extended into the valve chamber so far as to interfere with the valves. In this case the engine action was extremely peculiar. Besides the knock there would be at times a skip, sometimes a backfire, due doubtless to the fact that the intake valve wedged open. There was a noticeable lack of power. Inspect your engine for the same conditions.

Inspect the valve setting and see that the exhaust valve closes when the piston in that cylinder is at top centre. Next check over the timing. It is possible that the timing rod has been sprung or bent so as to retard the timer. With the spark fully retarded the coil should begin to buzz $1/16$ of an inch from the top centre.

Are you sure that the piston rings are tight? Be sure that the compression is good and that the cylinders are not scored. Measure all of the cylinders to see that they are round and not worn oval at any point. The installation of a set of leak proof rings may eliminate the trouble.

If you are using any kind of a water vapor attachment on the carbureting system, inspect it and be sure that it is not delivering too much water to the cylinders.

PLACING OF PISTON RINGS.

(O. W. O., Worcester, Mass.)

Will you kindly give me advice as to the proper placing of piston rings in a Packard twin-six engine? By this I mean the correct position of the joints in relation to the inside and outside of the blocks.

You did not say in your letter whether you were installing the regular Burd leak proof rings, or the ordinary type of bevel cut rings.

As far as leakage of gas is concerned the position of the joints in a Burd ring makes no difference in efficiency, for there is no more chance for leakage at the joint than at any

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other point in the ring. The question of weight is the only consideration, though even this factor is negligible.

From theory, both the top and bottom rings on every piston should be so placed that the joints or heaviest part is at the centre pointing toward the inside of the V, while the centre ring should be placed with the joint on the opposite side. While in operation the rings will gradually turn on the pistons until all joints, or heaviest parts, are on the outside or lowest point. This revolving action will result in even cylinder wear. As we said before it makes but little difference, however.

Where the plain bevel cut rings are used the cuts should be spaced in thirds. The top ring should have the cut on the inside of the V (both blocks), the second and third spaced at 60 degrees from it and from each other. This arrangement gives the maximum difference between each ring and a maximum amount of time is required for all cuts to register as the ring revolves in action. These rings are heaviest at the point opposite from the cut and will finally come to rest with all cuts on the inside of the V.

The spacing of rings on a four-cylinder upright engine differ slightly from that of a V type engine in that there is not so great tendency for the rings to revolve in the former. In upright engines general practise is to space the rings at 180 degrees, thus bringing the cuts in the top and bottom rings together, with the middle on the opposite side. (In a three-ring installation.)

If the pistons were fitted with four rings we would suggest that the first ring be placed with the joint uppermost (in the V), the second with the joint spaced 45 degrees to one side, the third 45 degrees to the other side and the lower with the joint at the bottom.

INSTALLING NEW PISTONS.

(J. L. W., Mount Oliver, Pa.)

I am having trouble with my ——— eight-cylinder car, which has been run about 7000 miles (eight-cylinder V type engine). There is an excessive oil leakage past the pistons and I have decided to rebore the cylinders and install a new set of pistons. The old pistons are fitted with only two rings above the wristpin and I think that the piston slap causes cylinder wear. Would it be practical when installing new pistons to install three rings above the wristpin and one below? To secure full lubrication is it all right to bore a number of holes, the same size as the wristpin, between the wristpin and the lower ring?

The second speed bothers me a great deal because it slips out of mesh very easily when engaged. Can you tell me the cause and remedy for this?

Before you have the cylinders rebored we would advise you to make a series of careful measurements to determine whether they are out of round or not. With the excessive supply of oil, which you claim the cylinders have been getting, it does not seem possible that the wear should be so great as to require reboring in so small a mileage.

The cylinder regrinding or reboring operation is too expensive to attempt needlessly, then, too, every time you have the cylinders rebored the walls are decreased in thickness and the engine depreciates to a certain extent. Of course if the cylinders are out of round they should be reground or rebored and new pistons installed.

Even with a two-ring installation there should be no trouble from binding at the skirt if the piston is properly fitted to the cylinder. Usually about .001 of an inch for each inch of piston diameter is allowed for clearance between the piston and cylinder, for when the engine is heated the piston will expand so that this clearance is reduced greatly. We would advise you to fit your pistons .003 of an inch smaller than the bore.

Three rings above the wristpin and one below is considered good practise. In many cases no provision is made in the piston for lubrication, the splash upon the cylinder walls being sufficient to fully oil the contacting surfaces. Some engine manufacturers turn a slight bevel edge, having a face of about 1/16 inch, on the lower edge of the third ring from the top of the piston, this being the ring above the wristpin. Through the piston wall and at right angles to the bevel on

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the edge of the ring groove are bored 1/16 inch holes about one inch apart around the circumference, extending toward the bottom or skirt of the piston.

We would not advise the boring of large holes between the two lower rings as you suggest, for such a procedure would doubtless render the lower ring inoperative to a certain extent.

Before you install the new pistons weigh the connecting rod and piston assembly complete of each set of pistons and be sure that they all weigh alike. This balancing will make for a smoother running engine and eliminate vibration from this source.

A set of leak proof rings installed in the upper groove of each piston may do much to eliminate your oil trouble, provided the cylinders are round, though if the cylinders are not round, the rings will not be of material value.

The trouble in the transmission is due to either of two things, the gears may be worn, resulting in a thrust action, which throws them out of mesh, or more probably, the change shaft in the cover is worn.

The change shaft in the transmission cover is fitted with two half round depressions into which a pin is pressed by a pin as the shaft moves from neutral to second or high speed. Possibly a stronger pin spring will solve the difficulty. If the slot is worn badly a new shaft will be necessary. Compare the notches in this shaft with those in the low and reverse change gear shaft.

EXCESS OIL LEAKAGE.

(C. J. T., Dayton, O.)

I have a four-cylinder 1916 Oldsmobile, model 43, that leaks oil past the rings in number one cylinder. Would you advise the installation of new rings, and if so, would you advise changing of the rings in the other cylinders?

Before you install a set of new rings in your engine we would advise you to make a careful examination of number

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one cylinder for piston or cylinder trouble. That this cylinder only is causing trouble evidently shows poorly fitted rings, or damaged cylinder walls.

Be sure that the cylinder walls are not scored or scratched and that the cylinder is absolutely round. If the scores or scratches are so deep that you find it necessary to have the cylinder rebored, it will be necessary to install new oversize rings and pistons in all cylinders or the engine will be out of balance.

If careful measurements and examination fails to show that the cylinder is at fault, you might install a new set of rings and one leak proof ring at the top of number one piston.

Only experiment will show whether it is advisable to install a leak proof ring on every piston. Should the compression be approximately the same in all cylinders, after the installation of a leak proof ring in number one cylinder, it will be unnecessary to fit all pistons with new leak proof rings. If number one cylinder shows a considerable amount of compression over that of the other cylinders a full installation of leak proof rings is advisable.

Excessive compression in one cylinder as compared with normal compression in the others of an engine results in overbalancing and possibly a knock.

AMMETER CONNECTION ON FORD.

(J. S., Detroit, Mich.)

I have a Ford car, model T, equipped with a Disco starting and lighting system, and would like to connect an ammeter in the circuit with the battery to indicate charge and discharge of the battery. Can you tell me how to do this and what size ammeter to get?

An ammeter of the zero centre type reading to 20 amperes charge and discharge will be amply large enough to take care of all the load.

If you will examine the wiring of your car you will find a

small wire leading from the side of the starting switch that is connected with the positive battery terminal. This small wire is connected with the motor generator and to it is connected a wire leading to the lighting switch. Disconnect the small wire from the starting switch and connect it with one pole of the ammeter; connect the other ammeter terminal with the starter switch, completing the circuit as before. Turn on the lights and if the ammeter indicates "charge," reverse the connections.

THE REO CAR. (Continued from Page 15.)

units should be tagged and removed. The four bolts fastening together the two portions of the universal flange should next be removed and after the engine retaining bolts have been taken out the engine may be lifted from the chassis.

To facilitate the work the generator should next be unclamped, the generator coupling unbolted and the generator, with ignition unit, taken off.

Examination of the Pump.

The circulating pump body should next be taken off. This casting is fastened by seven nuts on studs from the rear. When the body has been removed the impellor is exposed and after removing the nut on the end of the shaft the impellor, which is keyed to the shaft, may be pulled off with a wheel puller.

The pump cover, which is retained by two nuts, should next be slipped off. In order that this may be accomplished more easily it is a good plan to loosen the stuffing box nut. The starting ratchet, which is pinned to the crankshaft and the fan drive pulley, which is clamped to the shaft, should next be removed and the front timing gear case cover removed. The pump drive gear should next be pulled from the shaft and the shaft examined for wear. Excessive play in the pump shaft should be compensated for, either by the removal of the shaft or the bushing. Unless there is wear at this point it will be unnecessary to remove the shaft or coupling.

Removing Pump Shaft.

To remove the pump shaft, unscrew the nut on the end which retains the generator drive flange and after having driven out the pin holding the flange to the shaft remove the flange and friction disc. The shaft may then be removed from the front and the shaft bushing driven out toward the front.

Practically all of the repairs to the oil pump may be made by the removal of the cap at the bottom and outside the crank case, or by taking out the plunger. This member is fastened to the eccentric by a pin which is retained in place by a cotter pin. After the cotter pin and eccentric pin have been removed the plunger may be freed from the eccentric and removed.

Disassembly of the Clutch.

By inserting an iron Y bar between the engine and flywheel and hooking a heavy piece of wire around the flywheel to serve as a fulcrum, the heavy clutch springs may be compressed and the retaining nuts removed. This will permit the taking out of the spring bolts and the removal of the clutch cover, or so-called thrust member, together with the clutch plates and roller bearings. With the clutch out of the way the large nut on the end of the crankshaft should be taken off and the flywheel pulled from the shaft. Unless absolutely necessary the hub should not be unbolted from the flywheel. The holding bolts should be examined, however, and made tight if necessary.

The first and second camshaft bearings are retained by set screws, while the third or last is retained to the end of the crank case by cap screws. This last bearing need not be disturbed unless it shows evidences of wear. The other two must be removed before the shaft can be taken from the engine. Both the timing gears are driven on to their respective shafts and kept from turning by keys. Unless they show signs of wear or are loose on the shafts they need not be removed.

If it is necessary to remove the crankshaft the timing

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gear must be pulled off, then the rear bearing housing unfastened from the crank case and removed. After the main bearing caps have been removed the crankshaft may be taken from the rear of the crank case.

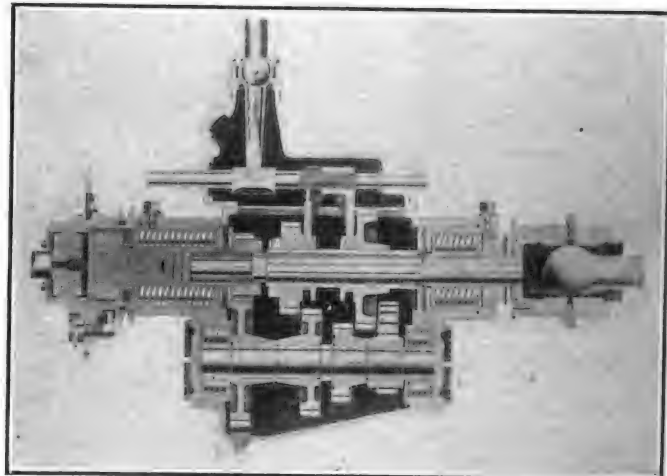
All of the oil tubing should receive a thorough cleaning. The oil tube leading from the timing gear case to the rear main bearing may be cleaned by means of a long, stiff, iron wire.

Reassembly of the Clutch.

With the removal of the clutch, as directed in this article, the disassembly is practically complete. In reassembling this unit a fabric covered driving disc should be the first to be placed in the flywheel, then a driven disc and the balance of the discs alternated. To remove this unit without disturbing either the transmission or engine is an easy matter. The two universal joint flanges are first disassembled and the short length of shaft between the joints removed. The clutch unit may then be removed by compressing the springs, as before directed, removing the retaining bolts and pulling out the clutch members.

After the universal joint at the back of the transmission has been uncoupled and the control rods disconnected, the change gear cover or transmission cover should be removed. The transmission should then be disconnected from the frame and lifted from the chassis.

Four screws fasten the starter ratchet to the clutch universal, when these are taken out the ratchet and starting sprocket may be taken off. The pin which retains the rear universal member to the driving shaft should next be taken



Cross Sectional View of Transmission.

and the member pulled from the shaft. After the set screw has been removed the rear roller bearing may be driven from the case. The front set screw is next removed and the front bearing driven into the case, permitting the removal of the drive gear. The front universal member is pinned and keyed to the drive gear shaft.

The jack shaft may be removed after the two plug adjusting nuts have been taken out of the housing. These plugs may be removed with a bar of iron. In replacing the assembly the jackshaft should be put into place first, then the drive gear and main shaft with the sliding gears. The jackshaft should then be adjusted endwise so that the drive and driven gears mesh the whole length of their faces. All end play may be compensated by proper adjustment of the plugs at the ends of the jackshaft.

Points of Rear Axle Assembly.

The rear axle is of the semi, or half floating type, and the complete axle with housings must be removed from the car for a complete overhaul. After having disconnected the brake rods and torque rod from the rear axle housing, remove the assembly from the car, taking care to have the car properly supported by jacks or horses.

Both wheels are held in the conventional manner by a lock nut and key to a taper shaft, and after the wheels have been removed the assembly should be placed on two boxes or horses. The pinion drive gear, together with its roller bearings, is mounted in an adjustable housing, called a cage,

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and is clamped into place by a locking bolt. The locking bolt should first be removed and the cage unscrewed from the housing. With the cage will be carried the pinion drive gear, the rear universal member and the two roller bearings. The pinion gear and shaft are integral and are fastened to the universal member by a taper pin and key. The universal member is first removed, then the bearing adjusting collar backed from the shaft, allowing the removal of the pinion gear and shaft from the rear. Both bearings may then be taken out.

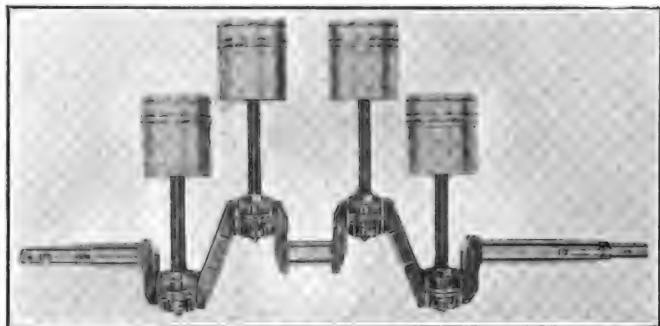
Before this assembly is put back into place, the pinion gear should be properly adjusted in the cage. First replace the universal joint member on the pinion gear shaft, then turn the bearing adjusting collar down until nearly all of the end play is taken up. Never adjust roller bearings so tight that there is no play, for, although the members will rotate smoothly, the wear will be great. When the pinion gear has been adjusted in the cage the cage may be replaced.

Adjustments of the Differential.

Both halves of the shaft housing are bolted into the central or differential casing and should next be removed. The differential assembly, together with the shafts, may be lifted from the casing after the cover plate has been removed.

The differential bearings may be removed, exposing the differential adjusting nuts, mounted on the differential housing. To facilitate adjustment these nuts should be left in place. Eight cap screws hold the differential housing together and when these are removed the differential may be disassembled. Both differential gears are pinned and keyed to the axles.

In reassembling the rear axle the differential, together



Piston and Crankshaft Assembly.

with all bearings and shafts, should first be placed in the casing, the two shaft housings put into place, then the pinion gear cage and assembly replaced.

The pinion gear should then be adjusted so that the back of the gear is on a line with the edge of the master or driven gear, then the master gear brought by the adjusting nuts against the pinion gear until the backs of the teeth are on a line and the teeth fully meshed or "bottomed." The master gear is then adjusted so that a slight clearance is had, and the pinion gear turned by a hand crank. As the pinion gear is turned the master gear should run smoothly with neither grind or rattle and if the gears are not worn badly, this may be had by proper adjustment, always bearing in mind that the backs of the teeth of the two gears should be in line.

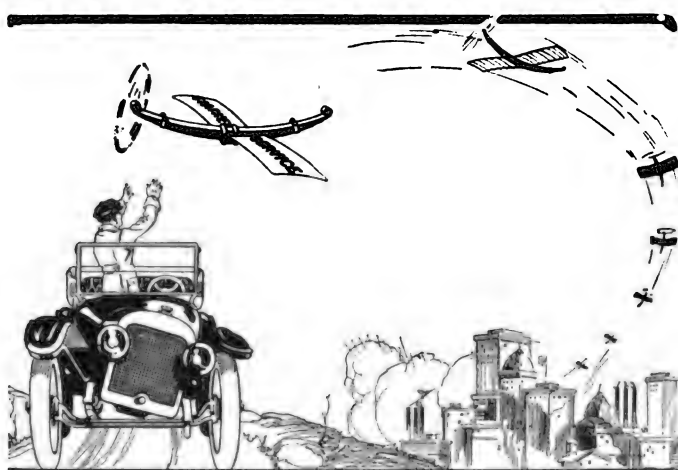
The front wheels are of the standard roller bearing type and retained by lock nuts and washers. As stated in the drive shaft and pinion gear adjustment directions, care must be exercised in replacing roller bearings not to make too tight an adjustment.

But one adjustment is necessary or provided for the steering gear, and that a roller contact stud in back of the sector. The sector should be near enough to the steering shaft pinion so that there is but little lost motion. An excessive amount of play between the wheel and the steering arm is evidence of looseness at the wheel, gear or sector, and should be compensated by the replacement of necessary keys or parts.

Timing and Adjustments.

The flywheel has upon its face three sets of markings: U. D. C. 1 and 4; U. D. C. 2 and 3 and E. C.; meaning upper dead centre of one and four pistons; upper dead centre of

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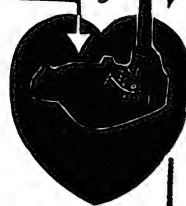


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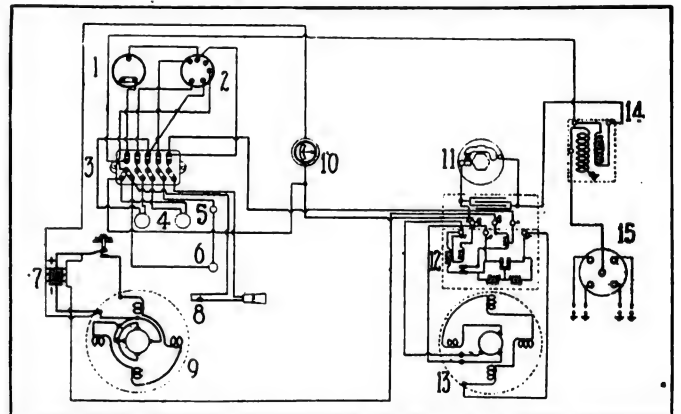


two and three pistons, and exhaust valve closes. With the mark U. D. C. 1 and 4 at the extreme top and on a centre line with the cylinders, the pistons in one and four cylinders are at the extreme top of their stroke.

To set the valves, if the camshaft timing gear has been removed from the camshaft, the flywheel should be turned until the mark E. C. is at the top and on the centre line with the cylinders. The camshaft should then be turned in a counter clockwise direction until the exhaust valve in either of the cylinders just closes. The camshaft gear may then be meshed and fastened to the shaft. Because of the fact that four screws are used in fastening the gear to the shaft flange, at least one point may be found where the teeth may be meshed. Not more than one-half an inch each side of the mark E. C. is permissible, since this is the latitude allowed for adjustment.

All of the tappets and valve stems should have a clearance between them of not more than .004 or the valves will be noisy. This adjustment should be carefully inspected after the engine has been properly timed.

Before finally coupling the generator shaft the ignition timer should be properly set. Remove the distributor cap and turn the generator shaft in a counter clockwise direction until the distributor brush is directly beneath the terminal to which is connected the wire from number one cylinder spark plug. Turn the shaft back or forward slightly to the point where the breaker points are just separating. Next turn the flywheel over until both valves in number one cylinder have closed and the mark U. D. C. 1 and 4 is at the top, then couple the generator to the drive shaft. With the



1, Ignition Switch; 2, Lighting Switch; 3, Fuse Block; 4, Headlights; 5, 6, Dash and Tail Lights; 7, Battery; 8, Horn Button; 9, Starting Motor; 10, Ammeter; 11, Breaker Box; 12, Cut Out and Regulator; 13, Generator; 14, Ignition Coil; 15, Distributor.

spark lever fully retarded the breaker points in the timer unit should separate at dead top centre of the firing stroke.

The two carburetor adjustments are a needle valve, located beneath the bowl, and a slow speed adjusting screw, located on the body just below the flange and slightly below the throttle valve.

First see that the carburetor adjustment on the switch bracket is turned to the run position, and that this adjustment gives full travel to the carburetor choke lever on the carburetor. The choke lever being at the front end of the slot with the control lever in the run position. Then turn off the needle valve until it seats, also turn the slow speed screw until it is also seated.

The needle valve should next be opened one and one-half turns and the engine started. After the engine has heated to normal operating temperature, suddenly open the throttle two or three notches. Should the engine back fire, open the needle valve until it does not back fire upon sudden acceleration. If it does not back fire close the needle valve until it does, then open it slowly until the back firing is stopped. The idea being to obtain just enough fuel to prevent back firing, but not an excessive amount.

The engine should then be throttled down and the spark retarded. By slowly opening the low speed adjustment a point will be found where the engine will run idle smoothly with the throttle fully closed.



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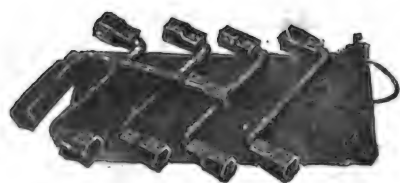
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VOL. LXIV.

PAWTUCKET, R. I., JANUARY 25, 1918.

NO. 1



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SERVICE GEAR & MACHINE CO.

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Strangling the Periodicals

Congress at its last session passed a hasty postal law increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT.

Some periodicals will be killed—all will be restricted in circulation and crippled. There will be fewer readers, and the habit of reading curtailed. The great function of periodicals is to assist in the spread of ideas—by printing the achievements in the world of thought, culture and science.

Thus to shut out farm journals—as these zone rates will—will lessen the productive power of our country by millions of dollars through loss of better methods. Shut off trade journals and you decrease the manufacturing power by more millions. Shut off the religious papers and there are shut off channels that have raised millions of dollars for distressed humanity. Shut off the great periodicals of the home and there is throttled an avenue that has given expert instruction to hundreds of thousands of mothers and saved their babies to health and citizenship.

These national periodicals are printed in the big cities—and the first zone, the cheapest zone, is in or near those cities; there are many educational opportunities near cities, and the cities will read anyway. Small towns and distant districts depend to a large extent upon periodicals; thus this law increasing periodical postage where it is most needed shuts off opportunity where needed. It penalizes periodical readers.

Repeal this law. Repeal this FIFTY TO NINE HUNDRED PER CENT. periodical postage increase. Sign the petition below and mail it. Put a cross mark in the square—save the periodicals and the work that they have done and are doing for national education and patriotism.

SIGN BELOW

CUT OUT. MAIL TO CHARLES JOHNSON POST, Room 1417, 200 FIFTH AVENUE, NEW YORK CITY

PETITION TO CONGRESS—Sign Here!

The spread of education, of culture, of scientific knowledge and advancement, and of our vast internal merchandising and manufacturing has been, and always is, vitally dependent upon the freest and cheapest circulation of periodicals. The penalties resulting from any restriction on the freest possible circulation of periodicals will be destructive of the best interests of our economic life and the opportunities of developing our best citizenship.

The postal amendment passed by the last Congress increasing the postage on periodicals from FIFTY TO NINE HUNDRED PER CENT. will throttle or destroy our periodicals at a time when the widest and most extensive circulation of publications is essential to the patriotism, education and upbuilding of our country.

Therefore, I the undersigned, do most earnestly demand the repeal of this burdensome periodical postage amendment.

Name.....

City or County.....

Street Address.....

State.....

Periodicals mean much in your life. If you will help by a few arguments with your acquaintances and an occasional letter in a spare moment, put a cross mark here.



Will you help in securing the repeal of this iniquitous law? ☐

CUT OUT. MAIL TO CHARLES JOHNSON POST, Room 1417, 200 FIFTH AVENUE, NEW YORK CITY.

NEW YORK

CHICAGO

CLEVELAND

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AUTOMOBILE JOURNAL

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JAN. 25, 1918.

NO. 12.

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Treasurer . . WILLIAM H. BLACK

Secretary D. O. BLACK, JR.

Published the 10th and 25th of each month by the

AUTOMOBILE JOURNAL PUB. CO.

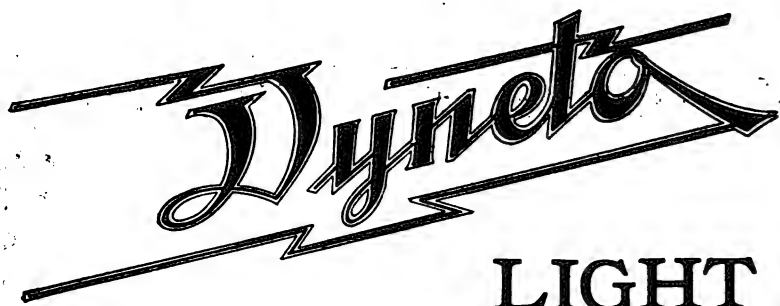
Times Building, Pawtucket, R. I.

MANUFACTURING conditions brought on by the war make it imperative that better use be made of used cars and that fewer cars be junked. Plants turning their attention to the more important work of making parts for military aeroplanes, trucks, munitions and other equipment needed by the Army and Navy, must reduce the output of new cars. While the utilization of the used automobile has always been a matter worthy of serious thought on the part of the owner, the turn of affairs in the business of the nation this year makes it more important than ever. Too often machines in excellent mechanical condition have been sold or exchanged at a sacrifice on account of appearance. Tops have become torn or misshapen and the finish has been destroyed by careless washing or prolonged exposure to the weather. Probably nine-tenths of the motor cars of America are entitled to better treatment than they have been accorded in the recent past. Conservation is now the keynote of our national life. Produce more. Save what we have. These are two essentials necessary for winning the war. Refinished, renewed cars not only restore to their owners that interest of which they may have been robbed by unkempt appearance, but their value as an asset is greatly increased.

“**A**S AN individual, if I were selling cars today and a man said to me, ‘I don’t want to buy a car now because it is war time; I want to wait until later,’ why, I should tell him, that this is the very reason he needs one now, because now he has got to be 100 per cent efficient.” This patriotic reason for owning an automobile was given by Hugh Chalmers, and while concisely stated, points directly at the truth of the situation.

THIRTY-EIGHT per cent. of the automobiles now in use are owned by persons living in towns having less than 1000 inhabitants, according to acceptable statistics. This showing that more than one-third of the great mass of cars used in this country supply rural and suburban dwellers with quick transportation pure and simple sufficiently refutes the argument that an automobile should be classed as a pleasure vehicle. Greater recognition is given every day to the fact that in cities or outside of cities the motor car is first and foremost a utility. It has liberated the city workers from the close discomforts of flat dwelling and it has broadened the man in the country so that, with its aid, the outside world has become his neighbor. It has created wealth, health and happiness in a degree that no other product of the new century can match. Without a doubt this will be a great year for the automobile.

CHICAGO’S great war time exhibition of automobiles follows New York’s, with all the difficulties hedged about the transport of freight and material in a winter remarkable for its severity and the utter failure of railroad movements, opens a brilliant exhibition with every prospect of big business. Shows fill a bigger purpose to the industry and to the public than ever. To a certain extent they mark the progress of a year, but in the truest sense they are no longer the actual exhibition of new models for the first time. Improvements go on the year round and are constantly announced. The shows round up the refinements of the year as a whole and engage the motorists’ interests in values and service. He is less prone to criticize, yet equipped to discriminate and filled with inclination to buy comforts and betterments.



LIGHT and POWER

Winter Business Means All Year Trade

You know that the winter months make it hard sledding in the automobile game. The labor situation makes it necessary that you hold on to your working force. How can they earn their wages and make money for you?

This is the answer: Sell Dyneto Light and Power Plants in your community. Think of the many prospects within a few miles of you. They all want light and most of them have the purchasing power.

The Dyneto Light and Power Plant is easier to sell and offers more profit than a low priced automobile. Hundreds of garage men have adopted this plan of increasing their profits.

You will make many sales right in your garage. Your plant will pay for itself in lighting your garage and electric sign, running your air pump and lathe, or in charging batteries at a remarkably low cost. You can use

it as a demonstrator to customers coming to your garage. But do not be content with that. Mount another plant on the back of an auto or on a trailer and send your men out after business.

Dyneto Light-and-Power Plants consist of a gasoline engine (gas or kerosene, if preferred), generator, switchboard and standard 16-cell storage-battery outfit. The engine is self-starting from the battery. Belted to a line-shaft the engine furnishes power for pumping water, running separator, milking machine, churn and for other power duty, while charging the batteries for light at the same time.

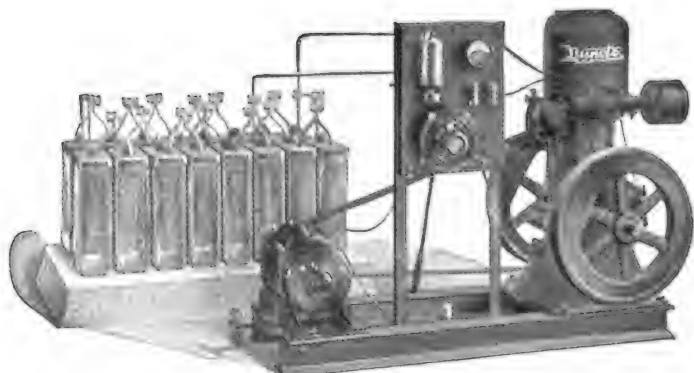
The Dyneto Plant is simple, trouble-proof, easy to install and care for. It can be furnished without engine if your customer already has an engine.

Plan to increase your profits by going after this business good and hard. Write to us today about the necessary steps.

DYNETO ELECTRIC CORPORATION

SYRACUSE

NEW YORK



DYNETO DOES DOUBLE DUTY

LIGHT AND POWER

(When Writing to Advertisers, Please Mention The Automobile Journal.)



**Dyneto
Electric
Corporation**

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Please outline your proposition
on selling Dyneto Light and
Power Plants in this community.

Name.....

Address.....

PAIGE

The Most Beautiful Car in America

"ALL SET"

January sales have given the lie to December alarms. The two big shows—New York and Chicago—have told their story—a story of enthusiasm, restored confidence and real business. There isn't a motor car dealer—at least an intelligent one—in the country today who doesn't know that the industry will "carry on" tranquilly, profitably, irresistibly in 1918.

Irresponsible newspaper stories were mainly to blame for the ridiculous alarms of November and December. When the government and the real leaders of the motor car industry got together, it didn't take long to come to an understanding. The government today knows precisely what the motor car manufacturers can do. And the motor car manufacturers know precisely what **they are going to do.**

That alarm—although perfectly needless—was by no means a bad thing for the industry—or for you. It proved one thing—a vastly important thing—and it was proved by the people of this country to Washington's satisfaction. It proved that the motor car is not a joy-riding luxury any longer—but an indispensable utility—a means of swift, economical transportation necessary to maintain our business efficiency—at a time

when it must be maintained. **Remember that in your own selling.**

As a result the motor car is here to stay—which means that sales are here and here to stay.

However, we must not forget this: While the American people in 1918 are going to buy motor cars liberally, they are also going to buy **them intelligently.** They are going to buy only the best cars, the best value, the best service and buy them only from **the best companies.**

Never in the history of the industry has it been so imperatively necessary for the dealer to look well into the foundation of the company whose product he sells, whose policies he represents and on whose wisdom and strength he is to live or perish—as it is now.

We don't send our boys "over the top" without an aviation corps to tell them what they're up against and direct their fire; without artillery to smash the opposition; without reinforcements to help them hold their gains; without guiding wisdom and heroic assistance to see them through to victory.

The Paige is ready to do that in this War Year of 1918 for all Paige Dealers. Paige Cars for everybody and all Paige Cars will be sold. We are "all set."

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, MICH.

The AUTOMOBILE JOURNAL

VOL. LXIV.

JANUARY 25, 1918.

NO. 12.



Some Car Attentions Tending To Make a Resale Easier and Service Better

A Profit in Sight for the Owner Who Gives
His 1918 Transportation Asset Careful Usage,
Good Grooming and Many Timely Renewals

THERE are two times when it pays to spruce up an old car; when you decide to keep it and when you decide not to. The production of passenger cars for 1918 being reduced by war conditions, an unusually large number of persons will be compelled to use their old cars, and the market for used cars shows itself extremely active. Hence, in both cases here cited it pays to seek the most profitable investments that can be made in improving the car's appearance. The preparation of a car for a resale, or for use the coming season, as the case may be, is a strict business proposition from first to last and a ceremony of no small importance.

Motorists getting cars frequently, or at least a succession of cars, observe many points in the selection and care of their cars which are beneficial and profitable to the single car owner if observed accordingly. For instance, the owner of more than one car, as the owner of a stable of fine horses was accustomed to do in the days of the supremacy of the horse, has frequent occasion to resell or trade out vehicles, and this fact governs many of the regulations under which he buys in the first place and the constant grooming of them during the course of their active service period.

In general, cars deteriorate in two particulars as affecting their resalability in the used car market, that is mechanically and in appearance. In each suc-

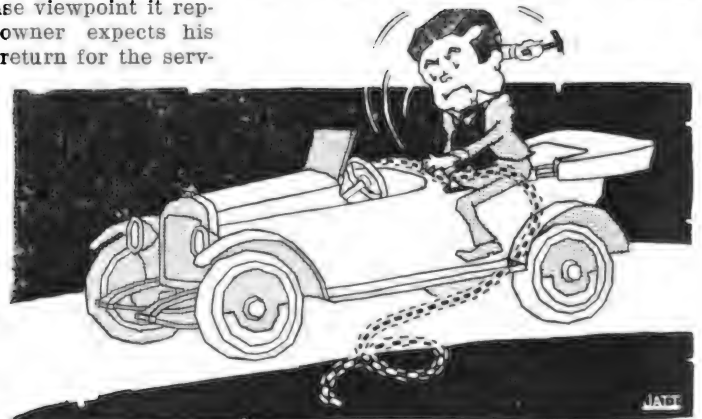
ceeding issue the Automobile Journal is taking up the overhaul of a popular car, detailing methods of inspection, the methods of disassembly and reassembly of the several units, telling how and when to replace parts and members. These articles have been running for more than half a year past and inquiries and appeals for more are constantly coming in and in increasing numbers. The care of the engine and inner mechanisms, repairs and replacements, is thus constantly presented in these columns.

General Wearing Qualities.

Between the deterioration mechanically and the deterioration in appearance there is another species of reduction in valuation that might be termed the constructional depreciation, which the use of any mechanical invention entails. In common speech this is most frequently referred to as the "wear and tear" and from the common sense viewpoint it represents what any owner expects his property to suffer in return for the service that it gives him. Such wear is both outward and inward. Now leaving the engine or power plant as a thing apart, take practically all the other members and units of the car and its body into consideration, just as if the owner were on the eve of a resale. What the natural elements do to the

body and trimmings of a car in dulling its appearance, jolts and vibrations do to the members as a whole. At this point the vehicle becomes almost animate and voices its protest in sundry ways which will displease the ear as much as shabbiness and rust will displease the eye. It emits sundry squeaks, rattles and knocks and there is nothing more annoying to the experienced driver than these gritting noises arising from various parts of his machine. There is much more to be considered than the fact that they work havoc upon the driver's nerves, because they also cover up and drown out any other more serious knocks in the engine or working parts, which, if they go unnoticed for too long a time, result in damage to the vital mechanisms of the automobile.

Three-fourths of the noises a car is heir to are to be found in the unsprung



Colored Braids so Many Traps for Snagging a Car Onto
the Purchaser for Good and All.

parts of the chassis. In general, squeaks are divisible into three classes according to their origin. They may be caused by wood rubbing against wood, metal against metal and metal against wood. A drop of oil or a little grease banishes the noise readily where metal rubs against metal. There is an objection to lubrication as the only remedy, however, in case the surfaces are exposed, for oil and grease soon collects dust and creates an unsightly spot. For the suppression of squeaks a paraffine and gasoline solution is often used very successfully for the reason that it is applicable to either wood or metal. This solution is made according to a recipe given in the chassis overhaul on another page of this issue.

Cautions in Original Selections.

There are a number of men who have no use for frills on a car. They do not want to pay more than the irreducible minimum for their cars. They dislike unending repetitions of laboriously rubbing up the coach. They do not mind spending a day on the mechanism in the certainty that the car's running will be bettered for three months to come.



Taking Steep Hills on High Is as if the Owner Took Hours of Exercise Hitting the Car All Over with a Heavy Hammer.

There are decided and concrete rewards for tuning up the engine, but they hate to be obliged to spend two hours polishing the plating and carriage work, knowing that the car will be as dirty as ever after two hours' use.

These solid, every day car users want a plain, serviceable car, with the minimum number of parts and a simple, workmanlike finish. If they do not buy the cheapest car on the market it is not the appearance of the car to which they object. Such a car may be frankly ugly when new, and not immensely uglier when its panels dull down and its brass work loses all semblance of gloss. They want to buy a car that will look smart, yet they are aware it will soon look worse than a cheaper car unless they devote an hour or more a day to rubbing them, and that even then they will have to spend about \$50 on paint and varnish before they can sell the car. Little leather covered tacks, colored braidings and polished or solid mahogany veneer are all so many little traps for snagging such a car onto the purchaser for good and for all.

The man who desires a serviceable, utility car, as a rule has it in mind that there will come a day when he will desire to trade it in or resell it in order to get a new model. Something is gained if the purchaser selects the car that reduces the quantity of bright metal work to a very small area. It is a good plan to select the car whose coach work is finished in dark gray. When delivered in the gray they can be the more readily painted and varnished before resale and for the equivalent reasons it is found most practicable to have the metal accessories finished in black or oxidized. Withal there is still a great amount of cleaning to be done and plenty of parts which are liable to injury if the car is roughly used. Quite a considerable number of small repairs have to be done before the car can be resold.

The preparation of a serviceable car for resale is considerable of a ceremony and owners should always bear in mind that whatever they do in this respect is worth it. Just what has happened superficially in the line of wear to such a car when it comes to the point of preparing it for resale is exceedingly interesting.

The following actual instance is a case worthy of consideration: The running and floor boards were covered with rubber about as thick as flannel. It was necessary to renew this, as it had been worn through under the chafing of the boots of those getting in and out. All of the nickel plated tacks and metal

strips by which it was attached had to be replaced. While the upholstery of the front seats required only to be treated with a "rejuvenator," it was necessary to recover the back seats, as many packages and parcels had been carried in them on various occasions. All the small tacks with leather covered heads which held the leather upholstery in place, and the strips of colored braid through which they were fixed were renewed as they were inclined to shabbiness. The undersides of both seat cushions had burst. Polished wood sills in front of both seat cushions required replacement because originally they had been made far too lightly. The metal work of the screen required replating, but all the other metal fittings required very little attention because they had been oxidized.

Much of the natural finish wood on the inside of the dash and the tops of the doors had to be specially polished. The mudguards had to be stove enameled and the tail lamp bracket had to be replated.

These details seem of small account

when a car is simply passing along the street on its accustomed utility or pleasure trips, but they count up heavily when the car is an offering in the used car market. If it had been taken to a shop the manager probably would have said that it had had very rough usage. In reality it had been made extremely useful by a suburban family, but its treatment had been almost as moderate and tender as is usual with the motorist in his first new car.

Signs of the 1918 Season.

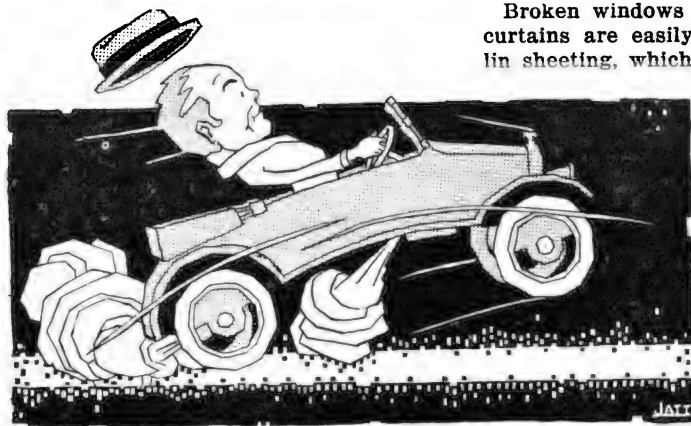
The traveling worth of a car bids fair to be more highly appreciated in 1918 than it has ever been. As the year opens with the government in control of the railroads and the general public sufficiently impressed that the war can make them shiver without coal and absorb food and drink without sugar, the motorist sees that his car is a decided asset. Many far-sighted ones are getting new cars and all indications are for a season that will see an immense number of new owners, both of new cars and of used cars.

From one end of the country to the other all the repairers of any description have more work than they can handle. The register of motor vehicles in the United States has almost reached the 5,000,000 mark. Little or nothing is heard in the industry of "saturation point," for transportation needs press so heavily that the coming season it is generally believed will be seeing everything on wheels moving that is equipped with an internal combustion engine. The country is feeling the pressure of war demands on the railroads and it looks almost too complacently on the fact that there are nearly 5,000,000 motor cars to fulfill motive duties when the railroads are so heavily occupied moving armies and equipment.

Many localities are preparing for the certain heavy demand for motor vehicles in the spring. Much overhauling in the shops indicates a degree of preparation for the unprecedented demand for cars coming so soon as the winter relaxes. Used cars will be very much in demand and owners have an exceptional prospect by first putting their car into condition of an advantageous position in regard to getting a new car. In the industrial communities workmen have been earning more money than ever before and they will wake up in the spring with more money than they have ever been able to accumulate. They are already finding short journeys, even such as to and from their work, attended with overcrowded conditions and prospect of interruptions or suspensions. The demand market for used cars and low priced used cars rises rapidly through these growing conditions. If the street cars fail them, and horses are hard to get, the workman will get to his work by his own car. This field promises to develop rapidly before the year is out.

Reclamation with a New Top.

This year the change of condition from maximum to minimum production of new passenger cars calls the refinishing of the old car most forcibly to mind, and raises the question of how it is to be



Too Rapid Acceleration of the Speed or Too Sudden Stops
Equally Injurious to the Power Plant.

done. Viewed in the light of dollars and cents, says the Du Pont Magazine, the \$2000 car has its exchange value reduced by from \$600 to \$1000 after a year of service. Its actual value from the standpoint of utility is not reduced to any such extent. The actual worth may not be reduced by more than 10 to 20 per cent. Cheaper cars depreciate in somewhat the same proportion. The big apparent loss in value is due most largely to the appearance of the top and finish.

Depending on the size and condition of the car, this refinishing can be accomplished at from \$30 to \$100 and will result in bringing the car back to its real utility worth, instead of its exchange value, thereby effecting a considerable saving in money, and restoring the pride of the owner in his machine. It makes him feel that he has accomplished something worth while.

The top question is the easiest. A dilapidated or torn top can be replaced quickly and cheaply by the repair man, and for many types of cars new top covers can be purchased ready made, and can be put on by the owner in little time. These new fabrikoid tops, put on by the shop or by the owner, will in most cases be even better and more attractive than the originals.

Refinishing the Chassis.

Refinishing the chassis and body is about as feasible, and, if done with high-grade materials and workmanship, will restore the original beauty. Here again the owner has the option of having the job done by the expert in the paint shop or attacking it himself. The new auto enamels especially designed for refinishing used cars will, where properly applied, produce finishes equal to new cars.

Broken windows in the side and back curtains are easily replaced with pyralin sheeting, which is the material most used by the curtain manufacturer, and scratched and discolored windows can be brightened by using solutions especially prepared for the purpose.

Varieties of colors in the tops and enamels make it possible to satisfy any desire in this connection. The old car is rejuvenated or renewed to such an extent that there is no desire to exchange, and the old personal attachment to the car is continued and the manufacturing plant is relieved of the necessity of building a new one, so the raw materials required for building the new car are left for more important uses.

Taking Stock of Asests.

Probably if the government, state, county and municipality places a few more surtaxes on the motor cars the owners will wake up to the fact that they really own something that has value and will cease treating them like umbrellas or summer cottages, which only receive attention when they are used. It would even be a hard problem for a psychologist to unravel the reason why motorists so seldom recognize the value in their car and the need of maintaining it. A man buys a house to live in or to rent and he constantly inspects it to keep it in good condition so that should occasion arise for its sale he would not suffer the inordinate depreciation that would follow if it was allowed to become dilapidated. He keeps it painted, keeps the plumbing in order, makes renovations to keep it up to the times with the result that it often has as great a value at the end of 10 years as it had when built and in the meantime rents for as much money as when first occupied.

A hypothetical case in which a man exercised the same prudence and care regarding his investment in a motor car would work out as follows:

He would take an interest in his car as he does his house; study it so that he would understand the conditions under which it would maintain its value and what care and replacements were

necessary to make it continue to appeal to the eye as a going proposition. The wearing parts would always be carefully lubricated and adjusted so that they would not work loose and probably damage the entire plant an analogy for which is found in a neglected home where the pipes are allowed to freeze and walls to go unpainted with the result that the damage extends to practically every part of the structure.

The "stitch in time" principle of care would be followed and wherever a screw, nut or rivet worked loose, even of minor importance, it would be immediately attended to.

He would understand the physical limitations of his car, which is the real secret of preservation, as the power plant and its component parts represent fully 80 per cent. of the car's value, and when injured, starts the whole machine down the hill of swift depreciation. Taking steep hills on high when there is a low gear designed for such work is much like hitching a horse to a two-horse plow and going at 20 to 25 miles an hour over rough roads, having the same effect upon the mechanism of the car as if the owner took a couple of hours' exercise a day hitting it with a heavy hammer.

What Careful Usage Will Do.

The careful motorist would wrap the brass and nicked finished parts with burlap or some other soft cloth when putting car away and would cover over his upholstery with old blankets, all of which work, including that of oiling and removing the tires, would not require more than several hours, while it would save many months depreciation. The top should be left up and the whole car covered with one of the huge paper covers that are sold for the purpose. This precaution excludes the dust and modifies the effects of the changing temperatures upon the car, especially to the finish, which is subject to cracking.

In washing the car almost as much care is necessary to preserve the deep lustre of the finish as in doing the more intricate mechanical work. An owner seldom realizes that the finish on his car alone represents upwards of \$100 if he were to have it redone, and yet he will drive into most any garage and leave it to be washed by a man who comes out with a cold water hose and coarse sponge or rag ready to scrape and mop the mud off, and in most cases take the paint with it. In washing the car, water, as near the prevailing temperature of the air as possible should be



Housing the Car Where Bumps Are Allowed; Where It Is Washed with a Cold Water Hose and Scraped with a Coarse Sponge, or Rag, Taking the Paint with It.

used, and should be used in liberal quantities so that all dirt on the finished surfaces is either washed entirely off or can be removed without pressure by a soft sponge. This treatment should be as carefully followed in cleaning the wheels, axles or other painted or finished parts as in the case of the body. There are very good dressings on the market for preserving tops, and the leather material used in a car, all of which judiciously used will help to preserve the original appearance and value of the car.

Dust constantly driving up against the body of a motor car has, of course, the effect of a sand blast on a reduced scale, and will eventually destroy the finish, in which case it is always best policy for the owner to have the finish restored by a competent body painter rather than to slap on a couple of coats of paint and varnish over the old coat, as the job will be unsatisfactory and will not add anything to the value of the car, while a well finished job will go a long way toward re-establishing the machine's original value in a prospective purchaser's eye.

It may be possible to convince a purchaser that the machinery is all right even if the exterior is shabby, but the reverse proposition is far easier and more profitable in the end.

Overloads to Be Avoided.

The owner would not overload the springs, as in doing so he is not only damaging them, but also the tires, frame and is subjecting the engine, clutch, transmission and every other moving and working part to abnormal strains and knocks. He should recognize the fact that if his car is designed for five passengers of an average weight of 160 pounds each, or to carry a total weight of 800 pounds, the engine, transmission, clutch, running gear and tires were chosen to perform their proper functions under average conditions with such a load. He would not reason that just because he could go along the level or down a hill with an additional 300 pounds of weight that his car was capable of handling it without injury to any of the parts. He would keep the proper pressure at all times in his tires and his springs lubricated so that the ruinous road knocks and vibrations would not reach and tend to destroy or crystallize the moving metal parts that are so carefully adjusted.

In starting and stopping his car he would be conscious of the fact that the law of inertia and momentum were constantly working, and that too rapid acceleration of the speed, or too sudden a stop, were equally injurious to the power plant, transmission, clutch, as well as the springs and also increased tire wear.

Once a year at least the car would have a thorough overhauling and all parts replaced where the wear had reached a point causing rattles, vibration or loose running to injure connecting or dependent parts.

All the evils of car neglect, however, do not come with its operation. Many, in fact, some of the most serious causes

of rapid depreciation are those resulting from improper preparation for storage, and negligent housing. In the first case the prudent motorist, if housing his car in a public garage, would not select one where the employees were careless, and other machines coming and going were allowed to bump into other cars indiscriminately when driving in and out; where there is no heat in the winter time or means of properly washing a car. When storing a car for the winter all parts not covered with paint or finished to prevent rust, should be thoroughly smeared with heavy grease and care taken not to get any on the exposed painted parts, as it will discolor the finish. The water should be drawn from the cooling system, the tires removed and taken into the home or cellar where an even temperature will prevail throughout the period of storage, as extreme changes of temperatures over a long period rapidly deteriorate rubber casings and tubes.

Packard Prices will Advance March 1st

All Models Affected and Driveway Charges May Be Added After That Date.

The Packard Motor Car Co. has announced an advance in the price of all models, to become effective March 1. The model "3-25" will be advanced \$250 and the model "3-35" will be increased \$200. Additional costs, however, might accrue after that date if it becomes necessary to drive the cars overland from the factory, but up to that time only \$42, the regular freight charge will be added.

The new price on model 3-25 roadster, five-passenger touring and seven-passenger touring cars is \$3950, and on model 3-35, seven-passenger touring, the new price is \$4300.

MOTOR CAR EXPORTS \$80,000,000

Over 75,000 Vehicles Were Shipped To Foreign Lands During the Past Year

THE United States is the world's market for motor cars and trucks at the present time. During the year just closed the United States shipped abroad more than 60,000 passenger automobiles, valued at more than \$48,000,000, and 14,000 motor trucks, worth over \$30,000,000, not including the cars and trucks bought by the United States government and shipped to our army in France. These 75,000 vehicles, worth \$80,000,000, represent less than four per cent. of the total production of cars in America and about eight per cent. of their gross value.

It is expected that after the war, when export embargoes and import prohibitions have been removed, so that commerce may return to normal conditions, there will be a great increase in the demand for motor vehicles throughout the world and that with proper preparation and co-operative effort between the manufacturers and the government agencies, much new wealth will flow into the country in payment for American materials and labor embodied in more than \$100,000,000 worth of motor cars yearly.

Among recommendations made by the N. A. C. C. export committee are:

That the Bureau of Foreign and Domestic Commerce in Washington increase the attention it is giving to investigation of foreign markets for motor vehicles and issue periodical reports relating to the automobile trade in foreign countries.

That the N. A. C. C. authorize a delegate to represent it officially at the National Foreign Trade Convention to be held in Cincinnati next April.

That the N. A. C. C. gather informa-

tion relating to available highway improvement data with a view to sending such material to countries where road construction is in a backward state.

That the N. A. C. C. undertake the preparation of a table of equivalents in foreign languages for standard technical automobile terms.

Tom O. Jones, special agent appointed by the Bureau of Foreign and Domestic Commerce to investigate the market for motor vehicles in the Far East, on the eight months' trip from which he has just returned, reports there are about 2400 automobiles in Japan now, and during the first nine months of last year 600 had been imported as against 218 during all of 1916. Japanese roads are very narrow and the bridges weak, but the army is using some motor trucks and the government is spending \$2,000,000 on the road from Tokio to Yokohama and ordered the provinces to improve their roads and bridges. Japanese army engineers brought an American truck over from Tientsin, China, and copied it at a government arsenal, but had so much engine trouble that the idea of manufacturing trucks in Japan has been given up and the government is now buying its trucks in this country.

Owing to the unsettled political situation in China, the Chinese hesitate to buy cars now because they are afraid they may be taken away from them. There are practically no roads in China outside of the cities and foreign concessions, but the governors of the provinces are beginning to realize that their districts are handicapped on this account and now propose to build roads to connect towns with the railroads.

Great Gathering of Trade At Chicago Show

AT THE opening of the Chicago National Automobile Show at the Coliseum and First Regiment Armory, there was every prospect that the exhibition of cars would be fully as large as had been anticipated and that everything would go according to schedule despite the severe weather conditions, fuel regulations and congested transportation situation throughout the country.

There are a total of 350 exhibitors, of which number 92 are car manufacturers, who are showing 400 car models, and 258 are accessory makers. In many respects the show is expected to exceed in importance the recent national exhibition at New York, as there will be many important trade conferences held during the week and a larger volume of dealers attendance is looked for.

Of all the activities incident to the show the war dinner of the Society of Automotive Engineers, the most important, draws many of the industry's famous engineers, who are now helping the government in mobilizing its resources against the foe. Dealers' rooms and in special quarters outside.

Motors Co., Dodge Bros. Co., Franklin Automobile Co., Velie Motors Corp., Paige Detroit Motor Car Co., Maxwell Motor Sales Co., Hupp Motor Car Corp., Vesta Accumulator Co. and the C. A. Shaler Co. There will also be a large number of garage owners present, as the Garage Owners' Association of Illinois will hold its annual convention in the city during the week.

While practically all of the cars seen in New York were to be on exhibition in Chicago, there will be three exhibited that were not on display at the Grand Central Palace, the Comet, Pan-American and Maibohm. The Deering Magnetic, which was not shown in New York, will be exhibited at the Automobile Salon, Inc., in the Elizabeth room of the Congress Hotel. This car is the latest in the field using the Entz system, magnetic transmission.

There are also a large number of accessory exhibitors at the Chicago show that were not at the New York show, the Motor and Accessory Manufacturers' Association having added the following concerns to the list that will exhibit:

Air Device Co., Chicago; F. A. Ames Co., Owensboro, Ky.; Anderson Forge and Machine Co., Detroit; Auto Pedal Pump Sales Corp., 456 Fourth Ave., New York; Bay State Pump Co., Boston; Carburetor Mantle Co., Inc., 1476 Broadway, New York; Copeman Laboratories, Inc., Flint, Mich.; G. L. W. Spring Oiler Co., San Diego, Cal.; Gibraltar Jack Co., 1902 Broadway, New York; Guaranteed Liquid Measure Co., Pittsburgh, Pa.; McCord Mfg. Co., Detroit; Menominee Electric Products Co., 1756 Broadway, New York; Miller Transmission Co., 90 West St., New York; New Era Spring and Specialty Co., Grand Rapids, Mich.; Wm. E. Pratt Mfg. Co., Chicago; Rajah Auto Supply Co., Bloomfield, N. J.; Rand Mfg. Co., Haverhill, Mass.; Rex Mfg. Co., Connersville, Ind.; Taft-Pierce Mfg. Co., Woonsocket, R. I.; C. R. Wilson Body Co., Detroit, Mich.; Wire Wheel Corp. of America, Buffalo, N. Y.; Woodworth Mfg. Co., Niagara Falls, N. Y.

These firms will exhibit in addition to the long list originally published and there will also be many exhibits at show rooms and in special quarters outside.

Grant Refinements Seen at Chicago

Extensive refinements both in chassis and body are incorporated in the Grant sixes for 1918, which will be known as model G. There are five body styles on one chassis and the new model is a larger car than the preceding ones. In appearance the most pronounced change is in the front of the car, a new high and narrower radiator being used, with nickel trimming, new mounting of the lamps and new fenders and splashers. The length of the car is accentuated by the high radiator and hood, sloping windshield and the low cut body, wide doors and long running board. Individual and adjustable front seats, double deck spring cushions, flat French plait upholstery and leather hand flaps on the doors are other improvements noted in the new bodies.

The six-cylinder overhead valve type

engine is continued in model G, but it has a number of improvements, including a balanced crankshaft, forced feed oiling and larger bearings all around. The use of the sod pan has been eliminated and the motor is protected by metal parts extending from the engine to the frame. The Bendix pinion, fly-wheel starting gear, clutch and clutch throw out are completely housed.

Model G electrical equipment is same as used last year, including Remy ignition, Wagner two-unit starting and lighting system, Willard Storage Battery and Stromberg carburetor. Semi-elliptic springs are used in front and cantilever springs in rear and the latter have been increased from 38 to 46 inches long.

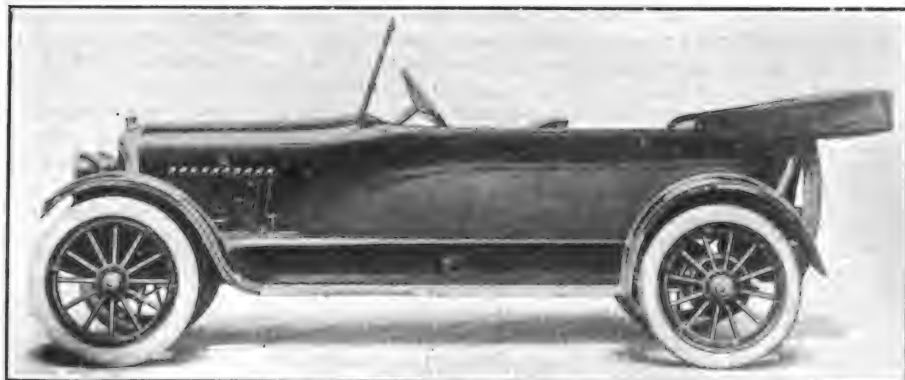
The five body styles include a five-passenger touring car and three-passenger roadster at \$1055; a five-passenger detachable sedan at \$1350; three-passenger convertible coupe at \$1575 and a five-passenger convertible sedan at \$1595. The three-passenger convertible coupe and the five-passenger convertible sedan are new this year.



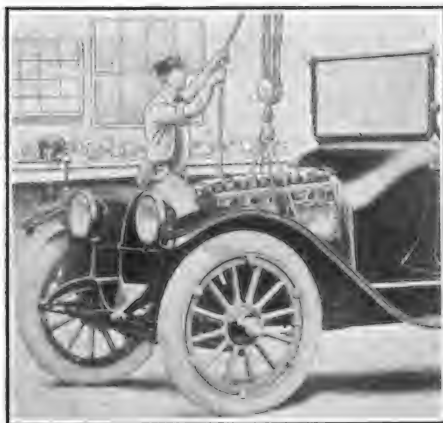
F. A. Seiberling, President Goodyear Tire and Rubber Co., Elected President of Lincoln Highway Association for 1918.

TRIPP HEADS ORDNANCE PRODUCTION DEPARTMENT.

Guy E. Tripp, chairman of the Westinghouse Electric and Manufacturing Co., has been granted a leave of absence for the duration of the war by the Board of Directors in order that he may devote his full time to his new position as chief of the production division of the Ordnance Department of the War Department. His appointment was one of the steps in the reorganization of the Ordnance Bureau recently announced by General Cozler, to effect a closer cooperation in its work.



The 1918 Grant Six Five-Passenger Touring Car. Price, \$1055.



Overhauling *The* Automobile

General Chassis Repairs

This is the 14th of a series of articles dealing with the purchase and restoration of used cars. It is the purpose of these discussions to show that a used car, one or more years old, has extensive service value, and that often, with but a slight outlay of time and the systematic replacement of a few parts, its usefulness can be increased greatly, making it for practical use, comparable with a new car. The 15th article of this series will appear in the Feb. 10th issue of the Automobile Journal.

THE previous articles in this series have been devoted to machine overhaul, the repair of the engine and its closely related important parts of the car. There is another factor entering into used car valuation, that of appearance and chassis condition. A car with an excellent engine, a mechanically perfect transmission and rear axle, of course, as far as service value is concerned, will be ideal to the man who cares not for car beauty, but is more concerned with actual performance of the machine itself.

A casual buyer, or one inexperienced in mechanics, is very apt to be greatly influenced by the car appearance. To such a buyer a shabby top, torn upholstery, unpainted fenders, or dented radiator, reduces the valuation by a big percentage.

Whether the car is to be restored for one's own use, or for resale, the owner should spend some of his time in improving the car's appearance. How to do this is the purpose of this article.

Tires and tire repair are an important item both in the upkeep or running expenses and resale value. With but a little effort and time tire mileage may be increased almost indefinitely.

Water and oil are the two biggest factors which make for tire deterioration, and for this reason moisture should be guarded against. This does not mean that a tire depreciates because it is driven through water, for it does not to any extent. It is only the moisture which remains inside the tire that does the greatest damage.

A tire is made up of cotton and rubber, the rubber vulcan-

ized into the fabric as much as possible. The carcass or body of a tire consists of cotton duck, which is thoroughly impregnated with rubber. Upon this carcass is built the tread which is vulcanized to the carcass. As time goes on internal friction tends to destroy the rubber in the carcass and lay bare the cords or threads of which it is made. As soon as this happens the cotton fibers are open to destruction. Water or oil enters the tire and rot commences. To prevent oil and water from working into the fiber is the first consideration.

Periodical Tire Inspection.

A periodical inspection should be given each tire and all holes or breaks in the rubber covering should be repaired. Small punctures or pin holes, if overlooked, permit the entrance of moisture, or road oil. Soon the cotton fabric around the hole is rotted and the action continues until a blow out occurs. If the carcass is not destroyed in this way the dirt entering the puncture, together with the oil or water, soon separates the rubber covering or tread from the carcass and a sand blister is formed. So long as the hole is open to the elements the depreciation continues.

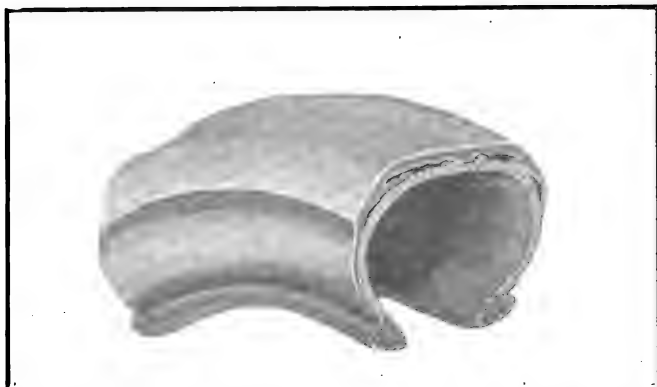
In repairing a small hole of this sort the rubber around it, as well as the cavity, should be cleaned thoroughly with gasoline and wiped dry. A coat of rubber cement is next given it, and, after it has been allowed to dry thoroughly, another coat applied. The hole should then be filled with crude or sponge rubber, forced into place and held by a layer of tire tape until dry. After the cement has dried the friction tape should be removed and the surplus rubber trimmed off with a sharp knife. Small cuts should be given the same treatment. Where crude or sponge rubber is not available ordinary rubber bands may be used.

If the cut is long standing and the tread has separated from the carcass around the break, the sand, oil and dirt should be thoroughly cleaned from the break, and, as above, a coat of cement given and allowed to dry. After a second coat the separated tread should be clamped down to the carcass and allowed to dry thoroughly. A third coat of cement is then applied and the crude rubber filler put into place.

Where the tread is badly broken and the separation extends for more than an inch the tire should be taken to a vulcanizer for repairs to prevent further deterioration. Although such a break can best be repaired by vulcanizing, a temporary repair may be made by the owner, which, if due care is exercised, frequently answers the purpose.

Good Method of Repair.

The loose rubber covering should first be removed and the edges of the remaining tread trimmed smooth. The break should then be given a thorough cleansing and the fabric roughed up with either sandpaper or a knife. Two or three coats of cement should then be applied and allowed to dry between each coat. A piece of rubber should then be cut from a discarded tire and fitted into the break. This piece should be cleaned also and given two coats of cement. After the cement has thoroughly dried on both parts they should be cemented together and clamped in a vise or carpenters' clamps and left to set for at least 12 hours. When this tire is replaced it should be inspected regularly, for it is at best a temporary repair, though it may last for the life of the tire.



Instance of Tread Separation, Caused by Oil Penetration. Immediate Attention May Save the Tire.

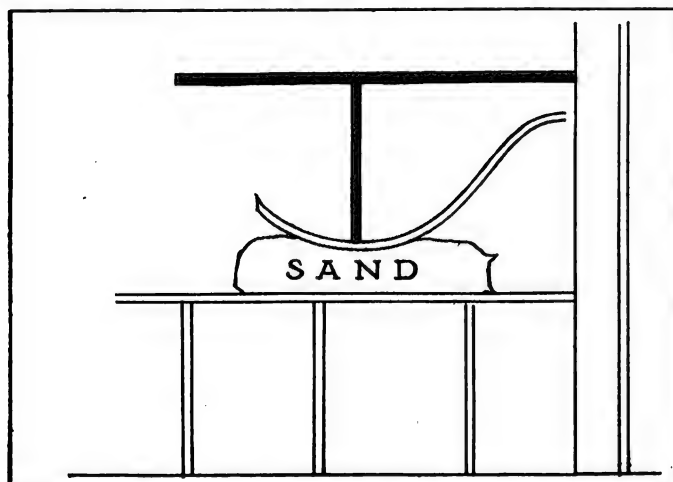
As far as repairs are concerned, tread or side wall rubber may be replaced very easily, because the strength of the tire is dependent upon the fabric or carcass. When the fabric begins to break, however, the tire is in a serious condition. Destruction of fabric is due not only to rotting from moisture, but also from stresses caused by contact with sharp points or edges. "Climbing" curbs would bring about such a result and though the break would not be evident from the outside, the cotton fibers or cords would be stretched and weakened at the point of greatest stress. A careful examination of the inside of the shoe will expose such a break, which should receive immediate attention.

Clean the fabric and rough it up with a piece of sandpaper, then apply three coats of cement, allowing each coat to dry thoroughly. Now strip off the tread from an old tire and cut out a section of the fabric measuring about 12 inches in length and wide enough to cover the inside of the shoe being repaired. Clean this patch and give it three coats of cement, allowing it plenty of time to dry between the coats. Cement it into place and allow it to dry at least 24 hours.

Where a break extends through both the tread and carcass a repair as directed in the preceding paragraph in addition to the regular tread repair will often be sufficient to increase the tire mileage. If the break is large, however, the shoe should be taken to a vulcanizer.

Guarding Condition of the Rims.

There is one more item that does much for tire mileage, that of rim condition. At least once a season all tires should be removed from the rims and the rims thoroughly cleaned,



Pressure for Reducing Bends May Be Obtained by Using a Lever and a Stick, with a Bag of Sand Beneath the Fender.

all rust removed and the rims painted either with special iron paint or with a thin mixture of orange shellac and lamp black.

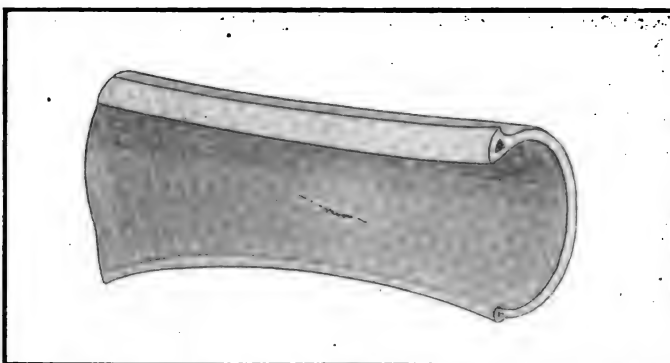
Because of the fact that a soft tire will have a tendency to pump water inside the shoe, a periodic examination should be made of the inside and all moisture dried out. In applying soapstone to the inside of the tire be careful not to use too great an amount or the end will be defeated. Just enough of this powder should be used to form a smooth coating over the shoe fabric and reduce internal friction.

Much of the tire and tube repair work can be done with one of the small hand size vulcanizers now on the market and the car owner is advised to purchase such a device, since the saving or salvaging of tires and tubes will soon pay for such a device.

Uncured rubber or repair gum may be vulcanized into place and forms a repair that is usually permanent. Holes in tubes as large as an inch in diameter may be repaired if one possesses a small vulcanizing outfit.

Patching Holes in Tubes.

For small holes in tubes an outside patch answers the purpose, but where the hole is half an inch or more in diameter an inside patch should be applied. Trim the edges of the hole smooth and clean and buff back from the edges inside the tube for a quarter inch all around the hole. Place a prepared patch made of a layer of cured rubber and a layer of



A Break in the Carcass May Be Unnoticeable from the Outside, but Will Soon Cause a Blowout Unless Repaired.

uncured rubber inside the tube and over the hole, covering the hole and about three-quarters of an inch larger all around. Moisten the patch and press it against the side of the tube by placing the tube on a flat table.

The hole itself should then be filled in with raw rubber just the size of the cavity and the small vulcanizer applied. To prevent the tube from sticking to the vulcanizer a piece of holland or muslin should be placed over the break.

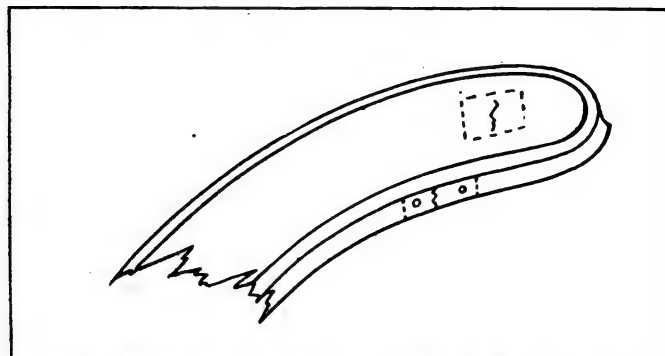
Points About Top and Upholstery.

Next in importance to the condition of the tires comes the appearance of the top and upholstery. Nothing detracts so much from car appearance as torn leather, with the hair filling showing through or bulging out through the breaks.

The ordinary method of repair adopted by the average car owner consists of cementing a leather patch over the torn place, either in the top or cushions. This is at best only a temporary repair and as soon as the patch tears away the condition of the seat or top is worse than before. To make a good repair the upholstery should be lifted by removing the upholstery nails or binding until space enough beneath permits the insertion of a large piece of heavy duck, leather or imitation leather. The piece beneath the break or in the cushion should be three or four times as large as the hole. Cement this repair piece to the underneath side of the leather and do the same with the patch on the outside of the break. With fine carpet thread sew all around the patch with fine stitches and, when completely fastened, go over the patch and leather with a good leather renewer, obtainable at practically any automobile supply house. Whether the patch is on the top or upholstery, water proof glue or cement should be used so that the elements will not dissolve the cement.

Where upholstery is badly torn new imitation leather may be used for covering and the amateur repair man may be able to do a very satisfactory job by using the French plaiting method. As a general rule the old covering had best be left on the seat or back and the new covering applied directly over it, the old will add strength and hold the springs and filling in place while the new is being applied.

If the old covering is fitted by plaiting the problem is simple. Starting at the right side of the seat, stretch the leather tightly and tack it down along the sides, stretching it smoothly over the seat. Place the tacks about one inch apart down



Breaks in Metal Mudguards Should Always Be Patched; the Patches Should Be Either Soldered or Riveted to the Metal.

the side and for five inches along both the back and front of the seat, then fold the free leather back for one inch and after drawing it tight tack it down, working forward for five more inches, until the whole seat is covered, the distance between the folds being four inches. As the work progresses the tacks should be removed from the old leather so that in the finished seat, except for the sides, the old leather will be held by the new tacks only.

If the old leather has been upholstered by the button method the button spaces should be filled with hair before the new covering is put into place.

"Dressing Up the Car."

There is no better time than during the winter to "dress up the old car." Repairing the top, tires or upholstery may be done at any time during the year, but the painting operation can best be done by the owner in the winter, for at that time there is but little dust in the air, the atmosphere is dry for longer periods and the car is ordinarily laid up for weeks at a time.

The latter stages of painting require a semi or heated garage, for excessive cold has a certain effect upon the paint that is not desirable. Before beginning to paint the car there are certain other things that should be done.

All of the dents should be removed from the metal parts of the machine and the broken places repaired. Pressure is the best means for removing bends in metal parts, for hammering has a tendency to stretch the metal and produce a bulge or buckle.

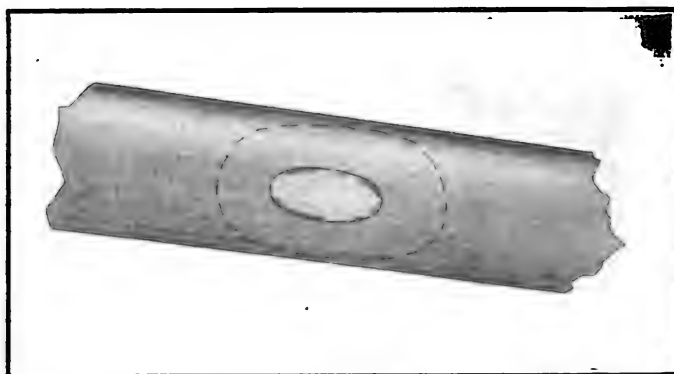
Removing Bends and Dents.

Hinged to the side of the garage, about 12 inches above the work bench should be a length of heavy joist, fitted with a wooden rod. With the joist as a lever and the rod pressing against a dented mudguard or fender, ordinary bends may be removed with but little pressure, leaving the surface much as it was before the accident. For different shaped bends the end of the rod may be changed. If the bend is short and deep a round point rod should be used; if the bend is long a block cut to fit the correct lines is used. To form a backing beneath the rod a bag of fine sand may be used.

Bends in the fender or mudguard bends may be removed with a pair of pliers, rather than pounding and should the binding wire be broken a patch should be riveted to the inside of the guard to prevent squeaks and rattles.

Should the bends be near the edge of the guard a long lever is unnecessary, if one is provided with a bench vise. In this case two flat wood forms should be prepared to fit the vise on one side and the curve of the fender on the other. The fender may then be put in the vise, a wood form placed on each side of the bend and the vise set against the dent.

Frequently the position or shape of the dent is such that ordinary pressure, instead of straightening the bend, will buckle it. In a case of this sort a brass or copper rod may be soldered to one side of the dent and the dent pulled out into place, using the rod as a lever. The same method may



Showing an Inner Tube Repair. A Patch Is Applied Inside the Tube and the Break Filled with Soft Rubber, Then Vulcanized.

be used where the dent comes in the middle of the back of a seat or member that cannot be easily removed for work at the bench.

Repainting and Glossing.

After all of the dents have been removed and the metal work patched up, preparation should be made for repainting the car. All of the loose paint and varnish should be scraped off with a sharp putty knife or screw driver, and if the car is to be painted a dark color or the same color as before, the old paint, which is firmly on the parts, may be left, since it forms a good foundation upon which to work. A smooth foundation is necessary and all of the parts should be gone over with steel wool, then fine emery cloth or sandpaper.

Any gloss left upon the metal or wood parts should be removed by the same means. Two thin coats of flat color should first be applied, allowing each coat to dry thoroughly before the next is put on. All of the painted parts should then be gone over again with fine finishing sandpaper and two more coats applied. Consecutive coats of flat color should be added and smoothed down until the whole surface is fully covered and absolutely smooth.

Lining is the next operation that will probably cause some trouble for the amateur painter. With a little practise, however, if the painter has a steady hand, he can accomplish this task very acceptably. Lining brushes are made up with long, soft bristles and the brush is dipped into the color, absorbing just enough to fill the bristles, but not to drip. A line is put on with a long sweeping motion. The painter should press down on the brush and "drag" it along, not stopping until the complete line is made. The little finger may be used to guide the hand by dragging it along the side of the fender or body moulding.

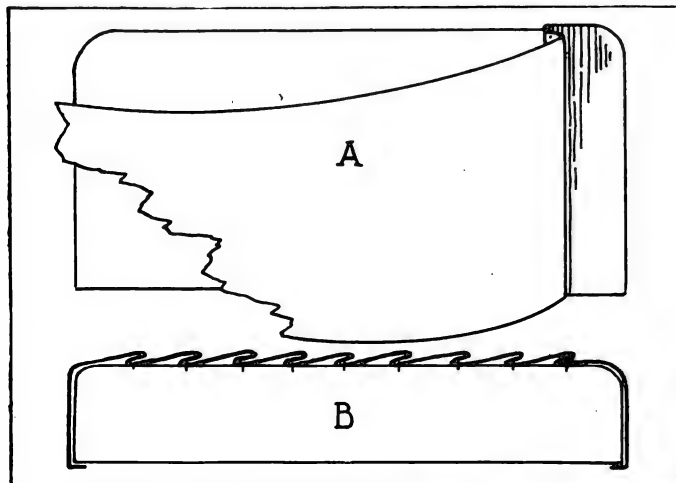
The writer has used another method for putting on very fine lines that works out very successfully if the color is correctly mixed. Prepare a pasteboard guide (for curves) or a long smooth edge for straight lines, and use a draughtsman's lining or ruling pen. Do not try to make the lines too broad with this instrument, or the color will not apply smoothly and will be apt to blot. Lines 1/16 of an inch in width can be applied by this method.

Method for Varnishing.

After the paint has been given at least 12 hours to dry the varnish may be applied. Three coats of outside spar varnish are first applied and then the parts should be smoothed down with a paste of pumice and oil.

Prepare a pad of cloth and wood as follows: Cut a piece of soft pine board half an inch thick by 1½ inches wide, by three inches long, and cover it on one side with a heavy pad of soft cotton cloth. Over this stretch another heavy strip of cloth and tack it to the sides of the wood block. This makes an excellent device for smoothing up the new varnish. Soak the pad well with crude oil and rub about half a teaspoonful of fine powdered pumice into the top, then carefully rub the varnish, smoothing off all of the rough spots and adding oil and pumice from time to time until all of the varnish has been gone over. Use the greatest care not to

(Continued on Page 47.)



A, Method for Folding Over the Upholstery Material at First Plait. B, Exaggerated View from End, Showing Plaits and Fastening Tacks.

Four - Cylinder Is Added By Studebaker

THE Studebaker Corporation of America, located at South Bend, Ind., announce their three new models, a four, light six and big six, known as models SH, EH and EG respectively.

A wide choice of bodies and combinations is offered in this series 19, and as far as essential features are concerned the three models are very similar. The new cars have full streamline bodies with a distinctive bevel edge. The seats are low hung, being roomy and comfortable, with deep, soft upholstery fitted by the French plaiting method. The windshield is of the slanting, rain vision type, and a long robe and hand rail extends across the full width of the front seats. The auxiliary seats in the seven-passenger car fold into the back of the front seats and are inclosed by a leather drop curtain.

The engines of the models SH and EH the four and six, are built upon practically the same lines with the exception of the number and size of cylinders. Model SH is a four-cylinder machine with a bore of $3\frac{1}{2}$ inches and a stroke of five inches, rated at 19.6 horsepower, S. A. E. formula, but develops 37.8 horsepower at 2000 revolutions per minute, the normal speed. Model EH has six cylinders, the same bore and stroke as the four, develops 51 horsepower at 2000 revolutions per minute and is rated at 29.3 horsepower S. A. E. formula.

Block Cast Cylinders.

Both of these engines have L head block cast cylinders with heads and cylinders integral; clearance at the base permits the removal of the pistons for repairs. The cylinder heads are fitted with water manifolds and a plug at the centre of each explosion chamber for carbon removal when necessary. The removable water manifold permits easy entrance to the water jackets for cleaning, a great convenience where the water supply contains lime compounds, which deposit on the water jacket walls and reduces the cooling area.

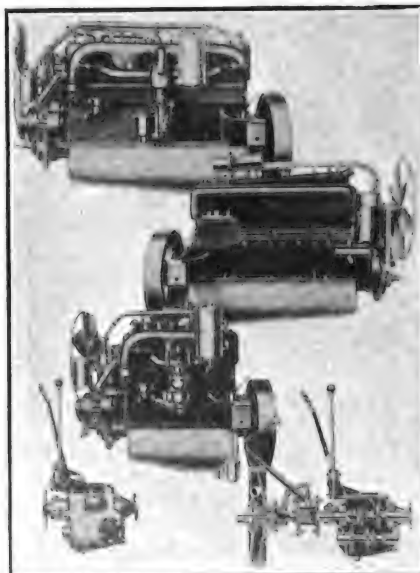
The valves are of the poppet type, large in area, and with a high lift to permit a maximum gas inlet. They are mounted on the left side and easily accessible, being cov-



Five-Passenger Studebaker Four Touring Car on 35 Horsepower Chassis with 112-Inch Wheelbase.

ered with protective dust plates.

Lubrication is had by the circulating splash method, the oil being carried in the lower part of the crank case, which is removable for repairs to the connecting rods and for cleaning. A gear pump draws the oil from the base and sup-



From the Top Down, Engines of Studebaker Big Six, Light Six and Four.

plies the splash pans, as well as the timing gears. Lubrication of the cylinder walls is had by both splash and through the wrist pins, which are of hollow construction.

A centrifugal pump driven from the timing gears circulates the cooling water through the jackets and a tubular radiator. A large four-blade fan promotes air circulation through the radiator.

Vacuum Fuel System.

Fuel is furnished the model R Schebler carburetor by a vacuum system, which draws the gasoline from a 14-gallon tank (on the four) and a 17-gallon tank on the six, mounted at the rear of the chassis.

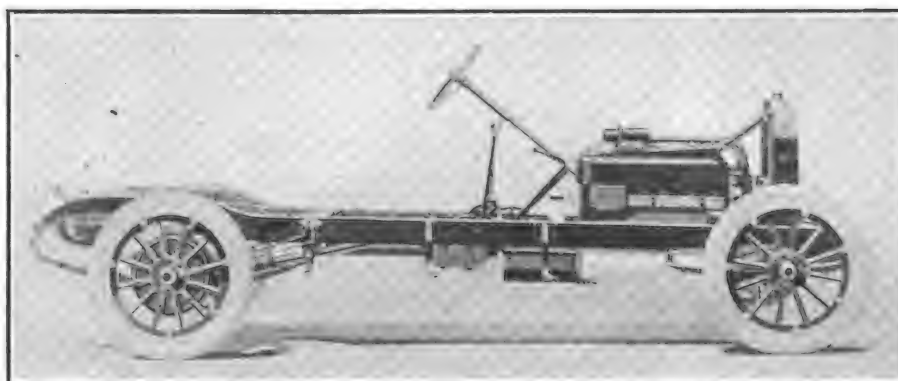
The electric system consists of a two-unit Wagner generator and starter motor operated from a clutch sprocket operating on the crankshaft, a Willard six volt, 100 ampere-hour storage battery and a Remy ignition distributor unit operated from the camshaft.

The engine of the Big Six, or model EG, is fitted with a demountable head and with a bore of $3\frac{3}{4}$ inches, a stroke of five inches and is rated at 36.2 horsepower S. A. E. formula, but develops approximately 62 horsepower at 2000 revolutions per minute.

On this engine is a Ball & Ball carburetor, instead of Schebler, as on the four and light six, and the fuel tank holds 21 gallons. Aside from these differences the specifications above given for the four and light six are equally applicable to the big six.

All three models are fitted with cone clutches, which, as the illustration shows, are very simple in construction. The throw out is mounted and works through double row ball bearings and is very easily operated. A double Thermoid flexible coupling carries the power from the clutch to the transmission shaft.

The transmission is mounted amidships and is of selective sliding gear type. The driving gear is mounted on two Timken roller bearings, while the rear portion of the main shaft is carried in roller bear-



Chassis of Studebaker Light Six, Which Has a 50 Horsepower Engine and a 119-Inch Wheelbase.



Studebaker Big Six Touring Car, with 40 Horsepower Chassis of 126-Inch Wheelbase.

ings at the back and also in the pocket of the main driving gear in the same manner, thus making four Timken bearings on the main shaft line.

From the transmission gearset power is carried to the rear axle through the propeller shaft, which is fitted with two universal joints, one at the transmission end, the other at the axle end. The gear ratio of the four and light six is four to one, while that of the big six is 2.7 to one.

The rear axle is fitted with Timken bearings throughout and is of the semi-floating type. Full adjustment for the differential and driving gear is provided. The master and driving gears are cut spiral to insure smoothness of action.

The springs, both front and rear, are semi-elliptic and so hung that the chassis has a low centre of gravity. The wheelbase and chassis length differs on the three models, the wheelbase of the four is 112, the light six 119 and the big six 126 inches.

Goodrich tires are on all models, the rear being Safety tread. Tires measure 32 by 3½, 32 by 4 and 33 by 4½ on the models SH, EH and EG respectively.

The body on the model SH four-cylinder car may be either a two-passenger roadster or a five-passenger touring. Four choices may be had in the model EH or light six, a two-passenger roadster, a four-passenger roadster, a five-passenger touring or a sedan, while the big six chassis may be fitted with either two-passenger roadster, seven-passenger touring or sedan bodies.

The color scheme on the four-cylinder car is dark blue, that upon the light six either dark blue or maroon, and that of the big six either chrome green or maroon.

MOLINE AUTO CO. AND ROOT & VAN DERVOORT COMBINE.

The Moline Automobile Co., manufacturers of the Moline-Knight motor car and the Root & Van Dervoort Engineering Co., both of East Moline, Ill., have been consolidated as the Root & Van Dervoort Engineering Co., an Illinois corporation. In the past the two companies have been under the control of the same officers and the same interests will continue to operate the merged company, the only change actually taken

place being that of the name. The Root & Van Dervoort Engineering Co. has been manufacturing high grade gasoline and kerosene engines under the trade name of R. & V. engines since 1898, when it was established. In 1904 the company's officials foresaw the big future in the automobile industry and established the Moline Automobile Co., manufacturing the Moline car, which later became the Dreadnaught Moline. The Knight sleeve valve motor was adopted by the Moline company for its product in 1913, which year the product took the name of the Moline-Knight and quickly established a widespread reputation through a 337 hour non-stop run under full load, during which it established new records for power, endurance and economy.

The Root & Van Dervoort Engineering Co. branched out into the manufacture of special munition lathes in 1916 and also took a large contract for 8-inch high explosive shells for the British government, and when this country entered the war W. H. Van Dervoort, president and general manager of the company, made an offer to turn his plant over to the government. This offer was accepted in part and the company is turning out quantities of war material for the government. In addition to filling these contracts for the government during the coming year the new company will continue the production of Moline-Knight automobiles, stationary engines, tractor and automobile motors.

The 1918 line of Moline-Knight cars will include two chassis, one 40 horsepower and the other 50 horsepower, to

be known as models C and G respectively. The touring and roadster types on the model C chassis sell at \$1650 and the model G touring at \$1985. There is also a sedan model at \$2280.

MOTORISTS OBJECT TO MASSACHUSETTS SURTAX.

Opposing the proposed surtax on motor vehicles in Massachusetts, the Bay State Automobile Association at its annual meeting passed resolutions objecting strongly to further tax the motor car industry at this time. The resolutions read:

"Resolved, That the Bay State A. A. members at their annual meeting wish to be recorded against the plan now proposed to place a surtax upon motor vehicles and operators of such vehicles unless said tax is made uniform to apply to every vehicle and every driver on the highways; and,

"Resolved, That the proposed increased tax on motor trucks is a tax upon business and it has not been recommended by the Highway Commission."

The following officers were re-elected: Arthur P. Teels, president; Fred T. Moore, Fred K. Swett, Dr. Herbert D. Boyd, M. D., vice presidents; Wallace O. Durrell, treasurer; J. Franklin Brown, secretary; Edward Becker, William F. Davis, William E. Hartwell, Jr., George W. McNear, John J. McNamara, Dr. A. H. McIntosh, D. M. D., Edward J. Sears, James T. Sullivan and Walter H. Williams, governors.

PRUSSIAN INVENTS POWER HOIST FOR FORDS.

Samuel W. Prussian of Cambridge, Mass., owner of the Guaranty Truck Co. of that city, has taken out a patent on a power hoist to be used with a truck attachment driven by a Ford power plant. A Ford chassis fitted with a Guaranty two-ton unit and equipped with the Prussian hoist was recently driven from Somerville to Boston, a distance of five miles, with a load of two tons of coal. The trip was made and coal delivered within half an hour from the time the start was made.

The hoist is simple in construction and easy to attach to the Ford transmission.



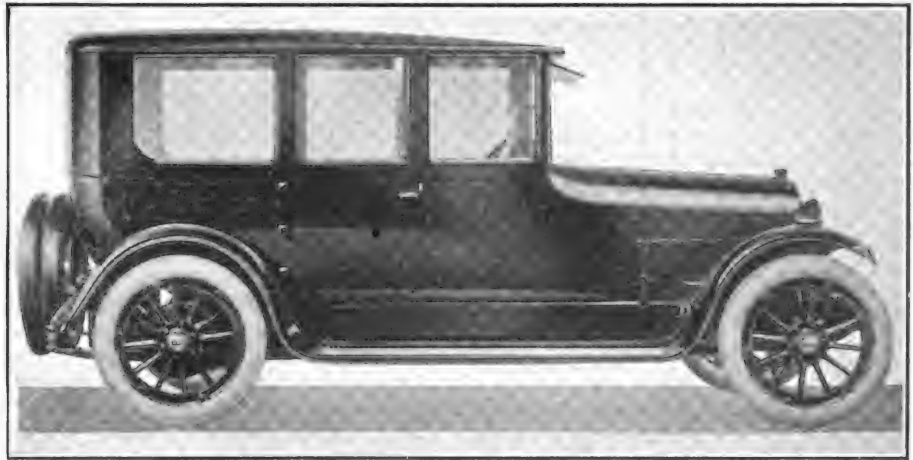
Studebaker Light Six Touring Car.

Case Announces Three Models In New Sixes

QUITE a change has taken place in the Case models for 1918. The manufacturers, the J. I. Case Threshing Machine Co., Racine, Wis., announce two-cylinders have been added to the engine and five inches to the wheelbase, which constitute the most important alterations in the standard chassis. Larger tires are fitted and roomier and more modern bodies supplied.

With all the new car is some 400 pounds lighter than the smaller 1917 model. The company no longer makes its own engines, for a Continental six replaces the old four.

The Continental engine chosen by the Case engineers for the new car is an L head type cast in block, having a bore of $3\frac{1}{2}$ inches and a stroke of $5\frac{1}{4}$ inches. Hence the engine is rated according to S. A. E. standards at 29.39 horsepower. The valves are mounted on the right side and are easily accessible. A water



All Seasons Model of the New Case Car, Having a Completely Closed Body with Permanent Top and Drop Windows.

ring no useless dead weight, and, withal, arranged with such simplicity as to insure accessibility of parts. The frame is designed for full Hotchkiss drive and it is substantially braced and hot riveted. A grouping of 24 units forms the base for the entire car structure and the result is a chassis conserving every inch of space and strong in its selected standardized units of proven efficiency.

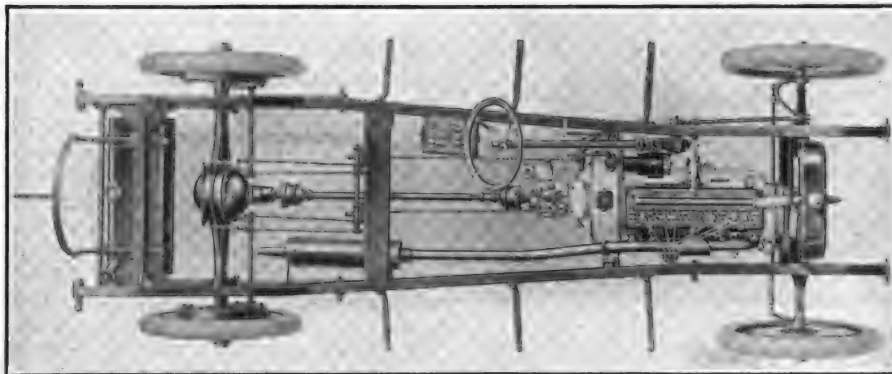
The electrical system is in separate units. It consists of a Westinghouse starting motor, of the geared to flywheel type, also a generator on which is

there is a straight, smooth slope from it to the cowl. The whole front is flatter and at the same time more graceful. The top of the body line from cowl to rear seat is horizontal and the whole design gives a conception of speed and comfort, which is further enhanced by the decidedly sloping, folding windshield. Mahogany paneling is used in the cowl board and rear of the front seat.

The Case Six All Seasons Model is a complete closed body built on the standard chassis with permanent top and drop windows. It sells for \$2375.

MOTOR MECHANICS REGIMENTS.

A. G. Batchelder, executive chairman, acting for the American Automobile Association, has asked for assistance from every affiliated motor club in the United States in order that two regiments of motor mechanics may be quickly enlisted for service with General Pershing in France. The United States public service reserve of the Department of Labor is handling the enlistments for the War Department. The two regiments must be filled by Feb. 1. Automobile mechanics capable of working on high grade gas engines receive the preference. Several hundred men are being recruited from the automobile centres in the Middle West, while numbers of them also come from garages all over the country.



Stripped Chassis of Case Six, Showing Sturdy Frame Members and Suspension of the Engine.

circulating system gives the power plant ample cooling, the circulation of which is insured by the centrifugal pump causing a sufficient flow of water through the water jackets surrounding the cylinders. The action of the system is completed by the aid of a four-blade fan forcing the air circulation through the radiator.

Lubrication is force feed and splash type, and the fuel is fed to the special Rayfield type of carburetor by a vacuum system from an 18-gallon (rear) tank. The clutch and transmission transfer power through a dust proof universal joint at each end of a tubular propeller shaft. This clutch, being a standard unit with a 10-inch adjustable dry disc, engages smoothly under operation by an adjustable rubber faced foot pedal.

The frame of the Case six chassis is six-inch channel extra deep section. It is consistent throughout its several members and the chassis balanced, car-

mounted a vertical distributor for ignition. These couple up with a three-cell, 90-hour storage battery.

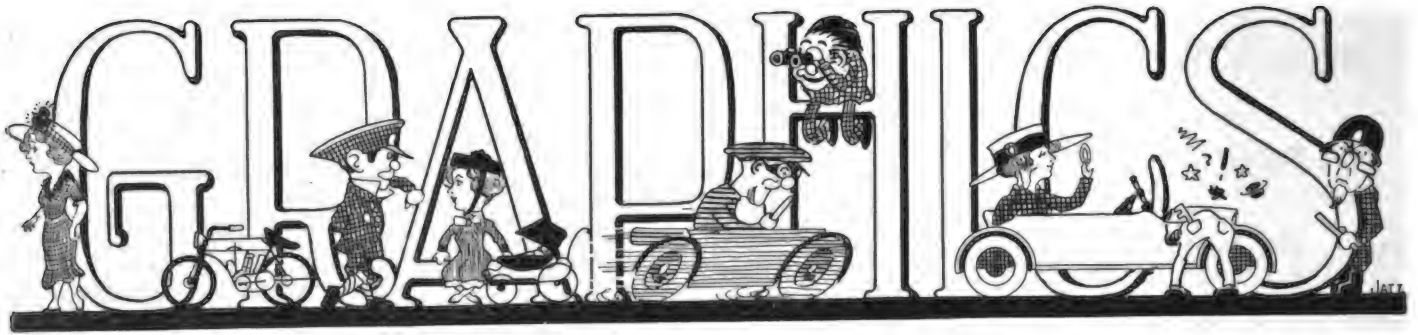
Cantilever springs have been replaced by underslung elliptics in the rear. The rear axle is a three-quarter floating type in which the radial and rear end thrust are taken up by roller bearings throughout, two in each wheel, differential and pinion shafts. The helical gears and pinion shaft are nickel steel and the drive shafts are $1\frac{1}{4}$ inches chrome vanadium steel. The front axle also has two roller bearings in each wheel. The steering knuckles are chrome nickel fitted with ball bearings.

There are numerous refinements and features, such as Kellogg power tire pump, anti-squeak bushings in the springs, spiral bevel final drive, ventilating rain vision folding windshield and one-man top.

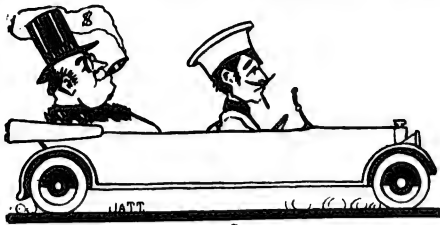
In the body the radiator is higher and



Rear End View of Distinctive Case Sport Roadster.



Reforms are effective in Russia or New York when comfort that is supposed to be solid is gently or forcibly removed from under some puffy autocrat. There is a good bit to be said in favor of applying the Boleshevik idea to automobiles. There are nearly 5,000.



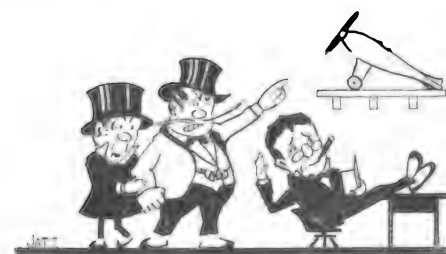
000 cars in the United States, but the enjoyment thereof is not as widely distributed as it should be. For instance, the city of New York owns a fleet of trim cars which are used faithfully by various conspicuous personages, or they were until Judge Hylan became mayor of the metropolis a few short days ago. Mayor Hylan passed out the Boleshevik idea that city automobiles must be used for city business only. He does not want his Democratic administration to leave in the minds of the people the pictures of commissioners and well paid subordinates lolling in automobiles with big cigars in their mouths as they ride through the parks. Those Boleshevik have started some painful reforms in little old Petrograd, but, after all, Lenin could obtain a few pointers if he should come to New York while Judge Hylan is wielding the prod under rooted privilege.

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One item toward making up an increase of over \$300,000 in the assessed valuation of the town of Southington, Conn., is the automobile list. This year there are 159 automobiles listed, with an assessed valuation of \$85,720, whereas last year's assessed valuation in motor cars was \$55,350.

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A \$50,000 law suit in Brookline, Mass., calls up from the dim past of 1911 a motor vehicle known as an aeromobile. The



vehicle was to travel in the air, on land and on water. So far it has not been able to cross Tremont street mud, which is neither of the aforementioned elements, but a mixture of them all plus a little vaseline, gasoline, benzine, kerosene, burning oils, cylinder oils, engine oils and axle grease. The inventor having failed to construct or demonstrate the aeromobile is the basis of the suits.

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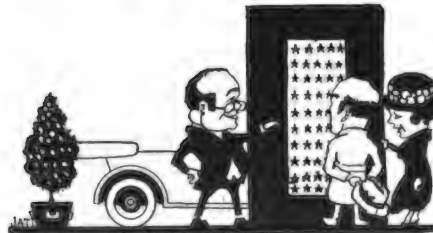
The Rhode Island assembly has an automobile headlight bill under consideration at the present session.

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Nantucket citizens are making another determined effort with the state legislature to secure a repeal of the law prohibiting the operation of motor cars on the island.

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The automobile industry has sent a big percentage of recruits to the war. Much was told without words in the display of service flags at the New York show.



There was a story behind every one of the flags of the spontaneous response which the young men, represented each by a star, made to his country's call.

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An attempt is to be made at the present session of the New York state legislature by the New York Automobile Association to have authority vested in the secretary of state to employ experts to pass upon headlight devices and lenses. The law has been much criticised because the authorities lacked means to determine whether the devices were designed to comply with the law.

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New York distributors say the automobile show helped local business, bringing about a better condition in the motor trade than had existed for some time. They also give much credit to the loyal support of the press in making the show the most successful in history.

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The gentleman at the next desk objects to a quick lunch place because the food dictator person smiled when he

counted nine strings of abbreviated macaroni as his portion and dropped a tear on his sorrowful ham-filled chicken pie, which was about the size of a three-cent stamp. Much sympathy is needed for dwindling quick lunch. There is more grief in New York, however, for it has



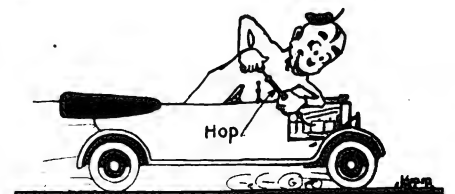
been discovered that some bakers have been using petroleum jelly as a substitute for food fats in shortening pie crust, cake and bread. War bread is endurable, but, oh motorists, don't lubricate with war pie.

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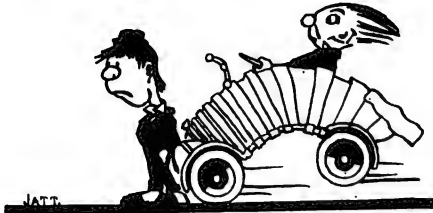
Matching its money with money from other sources, the Mankato, Minn., Automobile Club continues its program for road improvements in that locality. The improvement of the loop drive from Mankato to Madison Lake, thence to Washington Lake via the Marysburg church east of Duck Lake, thence to St. Peter road and back to Mankato is to be looked after first. The club workers also consider the Minneopa road ought to be put in good condition this season without waiting for a special state appropriation, which may not come for years, and that a guard rail should be put along the outside of the Good Thunder road on the curve just beyond the Mankato city limits. More local loop maps are being prepared and with these the club supports a lively campaign to route tourists through Mankato and among their local lakes.

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The commissioner of motor vehicles in Connecticut has taken up 52 licenses throughout the state, which were held by operators addicted to the use of deleterious drugs. Investigation disclosed that 27 of them had been in automobile accidents.



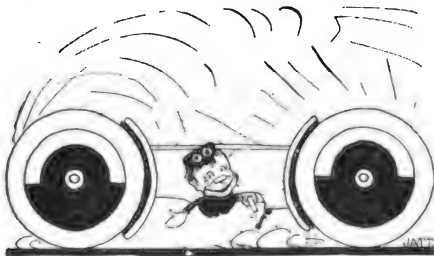
Automobiles do not very often run along the sidewalks, as the drivers know that the streets are intended for them to operate upon, but the average pedestrian seems to recognize no such reason in respect to conducting his movements and instead of using the sidewalks and cross walks in going about from one place to the other, takes to the streets at any point and directs his course at any angle regardless of the fact that he is impeding traffic, causing unnecessary danger to others, as well as himself. This type of thoughtless citizen, has for some time



been known as the "jay walker" in the parlance of motordom, but all efforts to legislate against him had proven futile up to the recent enactment in Seattle of a measure requiring that he cease to be a nuisance. An offender who insisted on tacking across the streets of that city and disregarding the warning of an officer to use the cross walks, was given a sentence of 12 days in which to realize that times have changed and the public welfare demands that careless pedestrians be protected against their own obstinacy.

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Inventive genius has elaborated upon the original motor car so that it is capable of navigating in all the elements, but less effort has been spent in making it fool proof than in along more essential lines. The amphibious automobile is of long standing and at the last aeronautical show in New York a flying limousine was on exhibition, but the auto-submarine is yet to be devised. A western inventor, however, evidently working with hopes of



attaining more practical ends, devised a car with wheels so large that in case it turned turtle it would still rest on the tires as in an upright position. This might be a step in the right direction, but the idea should be elaborated upon, and have wheels on both sides of the car at right angles to meet an emergency in which the car turned only half way over. In either case, however, it would be a good idea to provide means of glueing the occupants to the seats or have them wear aviators headgear.

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If your friend greets you with a hand shake that resembles the gyrations performed by a busy hand organist, don't



become alarmed, as he has neither become loco from lack of heat or crazy over the war, but is just passing along the latest shake of that great fraternity of fliver owners which now numbers some 2,000,000. The perpetrator of this new form of humor usually grasps his victim's hand firmly and whirls it around with the same violent motions employed in cranking a car. If the victim retains his temper long enough to inquire if the joker has saint vitus dance, he receives the reply that he is being initiated into the Ford hand shake.

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The so-called semi-civilized countries are not far behind the civilized ones when it comes to legislating against the motor car whenever possible and as often as possible and with little reason as possible. One of the august assemblies that passes upon the destinies of a province on the Gold Coast of Africa has with great zeal drawn up a law regulating the automobile traffic, in which it is wisely stipulated that no motor vehicle shall travel upon



the highways with more than one wheel upon any one axle. This action, however, should not be judged too sharply, as possibly none of the legislators ever saw an automobile and simply placed the statute upon the books as a means of enforcing economy in tires after they had received reports from Europe of tires selling at \$200 to \$500 each.

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So long as gasoline was only 47 cents a gallon in Cuba automobiles smoked just as offensively and as numerous in the island republic as they did elsewhere, but now, since the price of gas has gone up to \$1.25 per gallon, smoking automobiles in Cuba are as rare as the non-smoking ones. This simply proves that if foul-smelling motor cars cannot be curbed one way they can another.

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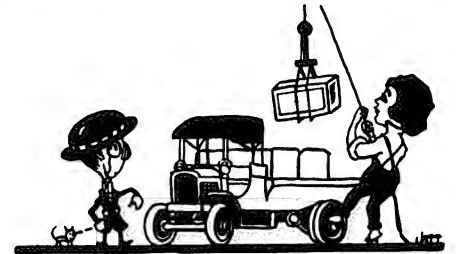
The famous Boardwalk at Atlantic City has seen many dizzy sights, but it remained for two "joyriders," recently, to



turn the famous promenade into a speedway. The son of a beach front hotel man and another youth drove their racing machines up an incline and burned their way two-thirds of the length of it before they met a policeman, who stopped them and showed them how to reach the street in safety.

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When the spirit of service to country is on a woman's mind a few injuries and discouragements will not stop her. For



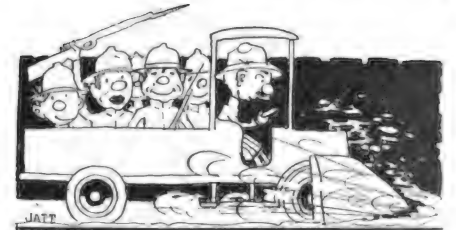
instance, there is the 1916 golfing champion of Boston, a 21-year-old slip of a girl, who escaped the German war on women and was saved going down on the Lusitania by the mere accident of making her homeward trip to London on that ill-fated vessel's last trip before it was sunk by the Germans. She received a permanent injury to her knee from aqua planing on Lake Winnepesaukee early in the war. She studied motor mechanics and applied to drive a war ambulance. Rejected because of her injury she turned to a big London business house and has been driving a truck for it for nearly a year.

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The federal investigation of gasoline production costs shows that retail prices are from seven to 10 cents above the refining cost. The cost of producing gasoline was found to be lowest in California, at 13.52 cents. The retail price in San Francisco was given at 20.5 cents. The highest production cost was in New Jersey and eastern territory, amounting to 17.642 cents, while the New York retail price was 26 cents.

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The residents of Pennsylvania living



along the Lincoln Highway were treated to an unusual sight recently when the trains of United States Army trucks passed over the highway enroute for Washington. The front truck in the caravan was equipped with a snow plow, which cleared the way for the other machines in the train, all of which were manned by soldiers. Snow impeded the progress of the trucks throughout most of the distance from Detroit to Washington and the idea of fitting the leader with a snow plow made possible the completion of the trip without experiencing a blockade of any magnitude.

NO SHORTAGE OF GASOLINE IN U. S.

Petroleum War Service Committee Gives Assurance That Stock of Motor Car Fuel is Really Increasing

THAT there is no shortage of gasoline in this country and that the stocks of gasoline are increasing is the reassuring announcement made by the Petroleum War Service Committee, which has compiled its reports on the situation and the record of the past year. This does not mean that consumers are invited to be wasteful of the precious fuel, or to use it unnecessarily, as the big demand for gasoline incident to the war will not develop its full proportions until the American expeditionary forces start operations in France. At that time the situation might have an entirely different complexion regarding the supplies.

"There is no shortage of gasoline in this country," says the committee. "As a matter of fact, as a result of the light domestic demand incident to the winter weather, the stocks of gasoline are increasing and will further increase before the heavy summer demand is encountered."

"While there is an increasing demand abroad for gasoline for use by our own army and navy, as well as our allies, the limiting factor there is shipping tonnage. All the gasoline is being forwarded for which ships are available. Experience and inquiry make it clear that the petroleum industry in America can and will supply all the increased demand for oil products for the war, provided sufficient tank steamships can be obtained. It is estimated that in 1917 not over 25 per cent. of the gasoline produced in this country was exported. That fact should be reassuring to any one who doubts this country's ability to supply the war requirements of our own and our allied governments for this important product."

"The need of immediate importance is that there be no relaxation in the production of fuel oil. This material, 'liquid fuel' as it is often called, is used by the oil burning vessels of the navies, by practically every industrial plant engaged in the manufacture of munitions, shipyards, gas plants, and even by some of the railroads."

REO CALLS FOR BRAKES ON DOLLAR PATRIOTISM.

"If you have noticed a pleasing absence of appeals to 'patriotism' in Reo automobile advertising, it is intentional," says General Manager Scott of the Reo Motor Car Co.

"I sometimes wonder at the affrontery of business men who use so sacred a thing as our national patriotism to push the sale of their wares."

"Seems to me it is prostituting man's finest emotion to a very ordinary, if not a base, purpose."

"We are just as alert to further the

reputation of the Reo product as any other manufacturer can be, but we do not believe in stooping to such methods by telling the buyer that it is 'your patriotic duty to buy, etc., etc.'"

"Nor do we believe that as a firm it is right for us to flaunt before the eyes of everybody the little part we are so fortunate to play in helping Uncle Sam along with his war plan."

"That is our patriotic duty and our privilege—it is as unseemly to advertise the fact as it would be to exploit personal charities or to press agent one's activities in the interest of public welfare."

"I have been astounded to note that some concerns that are manned by individuals who, in private life, would seem to be above such methods, have made the most flagrant abuses of the word 'patriotism' in this form."

"We Reo folk hope to do our part—if it were not for violation of what I have just said above, might specify how and in what directions we are and have been doing our part—but we do not feel that we are any more entitled to public patronage on that account."

"In fact, if somebody else makes a better automobile we would feel that we were less entitled to his patronage or his confidence."

"If the quality of the product itself is sufficient grounds for exploitation in peace times, surely we can adhere to these same qualities in war times and without appropriating to our own little personal advantage the quality of patriotism that all Americans feel and which, like religion, can be played upon by those who are sufficiently irreverent to do so."

MUSKEGON PLANS SECOND SHOW.

Automobiles, trucks and accessories will be exhibited at the second annual automobile show to be held in Muskegon, Mich., during the week of Feb. 25-March 2. The city, which is the centre of large automobile manufacturing enterprises, has enjoyed a remarkable growth in the past few years and at present is experiencing an unprecedented wave of prosperity, as most of its industries are flooded with orders and working overtime.

GOVERNMENT CARS NEED CARRY NO LICENSES.

The War Department has made a ruling that all motor vehicles owned by the government or operated exclusively by officers or employees of the government, may be used for official purposes without procuring state automobile licenses or identification tags. The machines will, however, bear metal plates issued by the government, or the corps by whom purchased, giving the initials of the department, the letters U. S. A., and the number of the vehicle.

HAYNES PASSENGER CAR SURVEY.

More than 80 per cent. of the passenger automobiles in America are indispensable to business, according to data gathered in a nation wide investigation just completed by the Haynes Automobile Co., Kokomo, Ind. A large part of the remaining per cent., it was disclosed, are essential to the personal efficiency of their owners.

The average business could not be carried on under war time conditions, at war time speed and with war time economy of operation without the passenger automobile. Even the reports from those who do not use their own cars regularly for business recognize the necessity for the so-called "pleasure car."

The public is accustomed to look upon the physician's use of an automobile as urgent. But it has preferred to class cars owned by persons of other professions and business as purely pleasure vehicles.

"We were convinced in our own organization that a large majority of the cars we were selling were being used in business, but it remained for this investigation to make us realize the full extent of their business importance," says A. G. Selberling, general manager of the Haynes Automobile Co.

A letter asking for complete information regarding the individual's use of his passenger car was mailed to 1000 owners living in all states. The names were taken at random from a list of Haynes owners, including city and rural districts. All kinds of business and all professions were represented. The letter was impartial, simply explaining the situation and asking that a post card be filled out and returned.

Farmers, jobbers, manufacturers, buyers, salesmen, physicians, attorneys, contractors, hotel keepers, executives—these are representative of the businesses which find the automobile a necessity according to the replies.

Car Adds \$350,000,000 to Crop

SIGNIFICANT to American thrift and history is the fact vouched for by one of the bright men who move the automobile business that the possession of cars and trucks by men of this country forced them in the last year to add 10,000,000 acres to the cultivated soils of the United States. That is, the power of

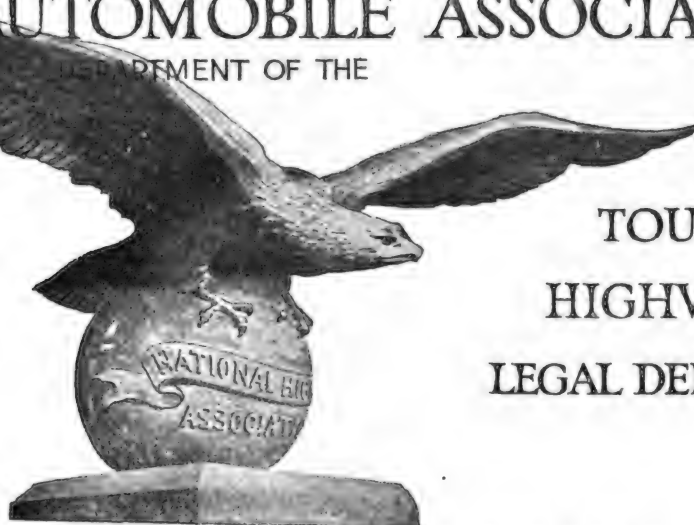
the cars, as compared to the power of the horse, gave the men strength and time to till that much more of the soil. Presuming that the 10,000,000 acres produced crops which sold for a value of \$35 an acre, the motor power machines enriched this country by \$350,000,000 in that one year.

OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL
HIGHWAYS
ASSOCIATION

TOURING
HIGHWAY
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

Service Values in Association Membership

Growth of Restrictive Legislation of All Kinds Warns
Motorists Not to Ignore "the Handwriting on the Wall"

IF ALL motorists could only be aroused to the menace in the growth of restrictive legislation of all kinds, the necessary steps would be taken to remove for all time the cause of this demand for aggravating motor legislation, which is forever asserting itself in the legislatures and motor associations. All this agitation has found its source in the acts of some motorists, otherwise there would have been nothing to give rise to the call for further legislation.

At first there were no speed laws, but despite numerous fatal accidents and the admission on the part of everyone that excessive speeds were dangerous to the motorists, as well as the public at large, offenders continued to drive excessively fast along the highways until they were penalized by law for so doing. Numerous convictions for the offense has had so little restraining effect on the passion for speed that occasionally it is advocated that all motor cars should be equipped with speed governors or else a law be passed restricting to sale only such motor cars as cannot by its power limitations exceed a certain speed. This sign is written as legibly as "the handwriting on the wall" in Babylon by the furore occasioned by the high fatalities in New York City and Philadelphia in the past year.

Until very recently there were no special lighting restrictions except those requiring that a motorist should equip his car with front and rear lights, but now there is a mass of statutes in the various states, almost impossible of interpreta-

tion, governing almost every possible function of the light, as well as its strength, scope and size. How came these on the statute books? Why by the same process of evolution that brought the speed restrictions. Every motorist had experienced the almost terrifying sensation of being blinded by an oncoming headlight glowing with full intensity, but instead of learning his lesson and setting a good example to others by fixing his lights so that they could be turned down when occasion dictated it, he gave the other fellow glare for glare on the ground that all are free and equal in this country. Why not an "eye for an eye and a tooth for a tooth," he reasoned, until the matter came up to the attention of the legislators, when he was forced by law to employ moderation in using his lights. This action necessitated trouble and expense on not only his part and all other violators of the ethics of night driving, but also placed a burden on conservative motorists who were as careful of the rights of others as their own.

Then there is the problem of the drunken motorist, who is directly responsible for much of the blame for carelessness that has been directed against motor car operators in general. Most states now single out the intoxicated driver and prosecute him whether he is in an accident or is only a menace, as it is only a case of time when he will be the cause of one. The penalties for driving while intoxicated have not been adequate to suppress the practise, as in

most cases they merely provide for a fine, which is easily paid. Some states, however, have added a jail sentence for this offense, but it is not inspiring, evidently, as numerous cases of infractions of the law are daily brought to the attention of the courts. Here is another sentence on "the handwriting on the wall" to which every motorist should take heed, as it is already leading to the drafting of some very drastic legislation that may harm the innocent, as well as the guilty. In New York state, however, there is a well backed movement against the intoxicated driver which would not only give him a long time in jail in which to think it over, but would also rob him of the privilege of operating his car again.

There is not a motorist who has been successful enough in business to own a motor car and has sufficient intelligence to operate it who is not capable of recognizing the rights of other motorists on the highways, as well as the rights of pedestrians, and the majority are in this class, but why the few continue to violate these rights and thereby invite expensive and restrictive regulations of their own liberties, as well as those of others, is difficult to discern.

That there is little influence without organization either in opposing vicious or class legislation, in obtaining satisfactory statutes or effectiveness in establishing rightful regulation of any kind is a fact that should appeal more strongly to motorists than any other class who have rights to protect. The fact that in

ADVANTAGES.

Cooperative buying is available for the member. Aid in securing reliable and competent chauffeurs, in recovering stolen cars and lost articles is given. Legal advice and touring information is given. All of this valuable service to the members made possible through their cooperative support as manifested and exercised through the association. Besides, they are promoting national highways and good roads everywhere.

"union there is strength" is the one upon which this great prosperous and powerful country was founded and upon which it has been perpetuated. Every man with property should be quick to recognize this as the underlying cause of his freedom and prosperity, and should utilize the idea it extends for co-operation in protecting his rights and in securing other benefits that can often be gained only in this way and at less expenditure than is ever possible through individual efforts.

Many motorists vehemently denounce incursions upon their rights and restrictions of their liberties and their wail is as ineffective as if shouted in a dungeon or on a mountain top unless it is backed up with the support of others of the same opinion. They fail to see the remedy for their troubles that is open through the influential motor association, which through its large membership and representation has influence in city, state and national matters, or else, if acquainted with the benefits to be derived from organization, feel as long as some one else is taking care of the matter and standing the expense they need not bother themselves, but can sit back and enjoy the benefits without expense or trouble. It is true that all motorists share some of the benefits secured for motorists as a whole by the motorists' association, but the non-member does not receive all the benefits accruing from that association in such things as personal attention and service. Yet he is depriving the organization from a support which would strengthen it and enable it to obtain even greater benefits for himself and others.

There are numerous advantages enjoyed by the motorist who is a member of an association, other than those of a nature affecting directly the operation of his car under legal limitations. He often, through no fault of his own, is brought into court to answer to charges of violations of the law. A member of the National Automobile Association finding himself in such a situation need only notify the nearest legal representative of the association, and he is represented in court free. He is saved the trouble, time and expense of hunting up an attorney to handle his case and is also assured that his representation in the courts will be by expert talent. The association has 70 odd representative attorneys in various cities and towns

throughout New England who can be called upon in emergencies when it is impracticable to call upon the legal department at headquarters in Boston.

Every motorist who finds use for his car over extended trips knows the value of road information, so that he can plan his itinerary in advance and not meet with many unexpected detours and impassable road conditions, necessitating delay and unnecessary discomfiture. To acquire this information alone as an individual he must invest in the neighborhood of \$20 to secure the necessary books and maps and then must do his own planning, while as a member of the N. A. A. he not only receives an up-to-date tour book of New England, giving maps and itineraries, which makes it easy to trace routes throughout that territory, but also receives, twice monthly, road information through the association's department in the Automobile Journal, and he may also obtain special itineraries upon application, for trips to any point in this country or Canada.

In the Automobile Journal, to which he automatically becomes a subscriber when joining the N. A. A., the member gets extended touring information and special tours, besides a general fund of information covering things in motor-dom in general, including expert advice on how to care for and repair his car: descriptions of the latest models and accessories that add to the comfort and convenience of motoring; plans for various types of garages. The member also automatically becomes affiliated with the National Highways Association, which is the greatest organization of its kind in the country, having more than four score representative organizations working constantly for the advantage of the motorist by urging and securing the construction of national highways and good roads everywhere. The N. H. A. issues colored plate maps, which are free to members of different sections of the country, showing the main highways that cross the country and those running north and south, as well as the connecting highways.

The cooperative idea of buying is also available for the member and he can secure the discounts made possible through the quantity buying plan. Along this same plan of service the association gives expert advice relative to insurance companies, policies, rates requirements and procures reliable policies in responsible companies.

Aid in securing reliable and competent chauffeurs, in recovering stolen cars and lost articles is also given the member and this assistance is made efficient through the extensive scope of operations made possible by organization.

All of this valuable service to the members is made possible through their cooperative support as manifested and exercised through the association, which is an organization looking constantly after the general interests of the member as a motor car owner, besides helping along a most patriotic movement,

INSIGNIA.

Affiliation with such a movement should be a matter of pride with every motorist aside from the direct benefit he derives personally, and his identification with the association, which should carry with it a certain respect from everyone, is denoted by the beautiful insignia plate after the design by the celebrated sculptor, Bela L. Pratt, which is given to every member to be placed on the front of the radiator of the car.

that of promoting national highways and good roads everywhere. This is not only an unselfish devotion to the interests of all motorists, but is for the general national welfare, as it will do more toward developing the wonderful natural resources of the country than any other movement.

BOUND TO SURTAX BAY STATE AUTOS.

Henry B. Endicott of the public safety committee of Massachusetts has a bill "to provide additional revenues by the imposition of temporary surtaxes on motor vehicles and operators thereof."

This is the second measure that has cropped out for the purpose of singling out the motorist unfairly as a means of raising revenue without making any attempt to levy against many other things that are of a less serviceable nature and which could lay no claim to being a practical necessity, such as the motor car has come to be recognized by men who are conducting the war.

The measure would impose on all automobiles, except commercial vehicles and such as are registered by manufacturers or dealers, the following additional taxes: Five dollars if the present fee is less than \$15, otherwise \$10; on all motorcycles, \$1. On the first five vehicles registered by a manufacturer or dealer, \$5, and \$1 on each additional car.

DON'T OPPOSE GOOD ROAD APPROPRIATIONS.

In a "War Time Decalogue for the Motorist," issued by President C. H. Larson of the Motor Club of New York, he gives 10 commandments as a series of "Don'ts" for automobilists, one of which is as follows:

"Don't oppose the expenditure of municipal, county, state or federal funds for the building of roads. They are a vital part of adequate military equipment and preparation."

Such advice is well founded and is supported by no less authority than the man who built the Panama Canal, Maj.-Gen. George W. Goethals, who is now highway engineer of the State of New Jersey. In a recent report to the State Highway Commission, he said:

"Modern highways are a military as well as a transportation asset, and, whatever the cost, such improvements were never so greatly needed."

Effective Road Laws Result of Federal Aid Act

The Federal aid road act, which went into effect in 1916, and provided for Federal aid in constructing roads in the various states, has greatly stimulated the movement for better roads throughout the country and, according to the Secretary of Agriculture, has resulted in the enactment by a number of state legislatures of effective road laws.

In his annual report the secretary stated:

"Legislative action in some states was necessary to meet the requirements of the Federal act, but many of the states have gone further and have recast their highway policies entirely. All the states have assented to the provisions of the act—42 by their legislatures and six by their governors. Thirty-three had a highway department within the meaning of the act upon the date of its approval. The remaining 15 have since enacted legislation creating highway departments which comply with the terms of the law. The highway departments in 18 states have been greatly strengthened, specific appropriations to meet the Federal funds have been made by 10, and comprehensive maintenance legislation has been enacted in nine states. Forty-two states now have satisfactory maintenance laws. Nearly all of the states have submitted definite schemes or programs of work for the entire five-year period covered by the act, or for the greater portion of it. The formulation of carefully prepared plans for the full period in advance of construction tends to prevent wasteful and haphazard undertakings."

Under the provisions of the act 40 states have submitted 183 projects, involving approximately 1730 miles. Of this number 139, embracing 1182 miles and calling for an estimated expenditure, including Federal, state and local funds of \$7,947,114.50 have been approved. These projects involve Federal funds to the extent of \$3,455,573.76, or 23.75 per cent. of the total allotment, \$14,550,000, to the various states for the fiscal years 1917 and 1918.

The expenditure of state funds in 1916 aggregated \$40,969,000. It is estimated that the expenditure of state funds in 1917 will reach approximately \$60,000,000, or an increase of nearly 50 per cent. These funds are distinct from local expenditures and indicate an advance in state participation in highway work.

HUGE EXPENDITURE FOR ILLINOIS ROADS.

A meeting was held in Springfield, Ill., on Dec. 18, when plans were made for the campaign to have the Illinois legislature pass a \$60,000,000 bond issue for road building next fall.

While this expenditure would not be immediate, but would be available for building the state's road system as soon



Ex-Governor John L. Bates, President of the National Automobile Association

as labor, transportation and cost conditions permit, it will be the largest bond issue ever made by a single state if passed, and is more than the total expenditure of state funds for road construction throughout 1917.

NEW TRIAL IN PROMINENT RHODE ISLAND CASE.

Judge Doran of the Rhode Island Superior Court has granted a new trial in the case of Miss Alice Sargent, daughter of Prof. Sargent of the Harvard School of Forestry. Miss Sargent was charged with manslaughter in causing the death of Edward Shea of Westerly, last July, while driving her automobile. The case was tried at the November session of the Superior court and she was found guilty of manslaughter with recommendation of mercy. The case was recently argued for a new trial before Justice Doran on the grounds that the verdict was against the law and the evidence, and also that the jury, after the case had been committed to it, was allowed to communicate with people other than the sheriff of the court.

The case attracted widespread attention, as it was the first of its kind in an automobile manslaughter case in this state in which a jury returned a verdict for conviction.

PURCHASER MUST STAND REASONABLE DAMAGE.

A Detroit judge has ruled that a purchaser must stand reasonable damage occasioned by the delivery of a car, and that owing to the emergencies of the times the delivery of an automobile under its own power is a legitimate method. The decision was given as it

has been stated, not long ago, in a case where a purchaser sued a dealer for damages to a car delivered with worn tires and scratches on the body, resulting from the car being driven over the road from the factory. In qualifying his decision the judge said that the courts must take cognizance of the fact that the railroads are badly congested and that in delivering cars under their own power the automobile manufacturer makes use of the only means of delivery now open to it that does not add further to freight difficulties, thus making the prosecution of the war that much more complicated.

The plaintiff sought to recover the purchase price of the car he had bought but lost the suit.

BILL TO CHECK CAR THEFTS.

Massachusetts has led the other states in adopting many commendable automobile measures and the legislature of that state now has before it a bill that if enacted will class with some of the other statutes as promoting the interests of motorists, as it will deal a direct blow to the sale of stolen automobiles, which has attained such alarming proportions in a number of places that insurance companies are refusing to write theft policies at any premium.

The bill, which has been filed by Senator George A. Hastings, is accompanied by a petition signed by a number of prominent residents of Berkshire county, which the senator represents. It provides that the vendee or vendor of any second hand automobile must file notice 24 hours before the sale with the chief of police of the city or town where the owner of the car lives; names and addresses of both parties in the deal, the names and addresses of all persons known to have possessed the car at any time and a description of the machine must also be given to the chief of police.

This bill would not give an unlawful dealer the opportunity of declaring that he did not know the car he purchased had been stolen and would also furnish the police with a means of tracing a car about which there was a question of ownership. It would also make it a hazardous proposition for a thief to attempt to dispose of a car he had stolen within the borders of Massachusetts. However, if it was found to be effective as a means of checking the thefts of cars in Massachusetts, the other states would not be long in enacting a similar measure, which would practically close the market for stolen cars and thereby stop the traffic in them.

The State of Pennsylvania received from auto license fees during 1917 \$3,268,025.50, as compared with \$2,325,056.50 in 1916. The last tag issued, including all tags lost and replaced, bore the number 312,598.

Up-To-Date Motoring Modes

By MRS. A. SHERMAN HITCHCOCK.

THE season between winter and spring is by far the most difficult for the motor woman who would be smartly and appropriately dressed. The reason for this is because there are always some wonderfully spring like days in February which make the winter garments seem common place and worn. Then just as one tempted to get herself into spring raiment it is winter all over again and furs and warm wraps are most delightfully warm and welcome.

All motor fashions, and especially those for the coming spring, are inspired very largely by the necessities of the present day; simplicity and conservation



New Fieldkote Raynster, showing the popular military lines, rain, cold and wind resisting; made of olive tweeds, also khaki and olive drab fabrics.

are the keynotes. The difference between last season's styles and those exploited for the coming one is very marked. American designers are not using ideas derived from the dress of any period in history nor the national costume of any country, but rather are giving strict originality to their creations in order that they may fit in with the requirements of the times. Conserving fabric and adhering to simple effects are the best way of expressing the general needs of a country at war.

Favorites in Mohair Material.

There are two of the most excellent materials which will appear in the shops shortly, which, if not designed expressly for the motor woman, will exactly fulfill her requirements. These are the Blue Bonnets Serges and the Minerva Plaids, both of which are mohair material, and mohair is a fabric which needs no recommendation to the knowing motorist.

The Blue Bonnets Serge comes in both a serge weave and a plaid in self color in a variety of about 20 colors each. They are 32 inches and will retail at about \$1 a yard. The colors, in both the plain and plaid, are lovely, and all the newest ones are represented. The plaid is sure to be a favorite—it is so new and distinctive. The Minerva Plaids embrace every color combination and variety of size and style of plaid imaginable. The wearing qualities of these mohair fabrics are wonderful; they will stand the hardest wear, will not wrinkle or crease, will shed dust readily, will last indefinitely and present a most attractive and modish appearance. These materials are adaptable for frocks, coats, suits and skirts. For the touring motorist nothing better could possibly be found.

With the great need for conservation of wool, silk garments will be in great evidence for motor wear, as well as for all other wear. The coat of silk may be warmly interlined and also carry a warm lining when it is intended for very early wear; in fact, a great many coats made of silk, having linings of corduroy and interlinings of lamb's wool are now seen. A coat of this character is as warm as the fur garment. It also possesses that appearance of rich simplicity which so strongly appeals to every woman of fastidious taste. Some of the new and distinctive silks to be especially recommended for the motor woman's wear are Ruffanuff, Amphora and Khaki-Kool. Coats, suits and frocks of Ruffanuff are wonderfully popular at Palm Beach and Miami at the present time among the smart motorists, of whom there are very many. This material has an irregularity or roughness in the cross threads which gives it an unusual and distinctive appearance. It comes in all the new colors and in white and natural is guaranteed to launder. Amphora is a rugged weave of undeniable charm and slightly heavier than Ruffanuff. It will launder particularly well. The majority of motor women are familiar with the great excellence of Khaki-Kool. The colorings and designs are entirely new and the manufacturers are predicting this material is to have a wonderfully big year. Mandarin Crepe, a silk and wool material, is a splendid motor garment fabric and comes in modish shades. Roshanara Crepe, as already told you, is to be one of the spring favorites and nothing is more lovely or effective.



Falconkote, a smart, new model of the Raynster, made in fancy checks in various shades and combinations, and of several materials such as cashmeres, tweeds, repps and fancy mixtures, all of which are storm proof.



The Coatee of Fur, a strong favorite for use in the enclosed car, will be worn late into the Spring and some fashion authorities say will take the place of the smaller fur used right through the Summer for several seasons. This smart model of Hudson seal, when worn with a Georgette frock made with the harem hem, renders the wearer very distinctive. Courtesy C. C. Shayne & Co., New York City.

Ruffanuff Motor Coats.

A smart motoring coat designed for the South is of natural colored Ruffanuff combined with bright palm green. Green is to be a leading shade for spring and summer wear. This coat is very slim and straight, with peg pockets lined with green. The seams are piped with green and the buttons are edged in it, and there is a very light weight lining of green silk. A small, close fitting turban accompanied the coat and was made of the Ruffanuff with a facing of the green. There is to be a great vogue for scarlet and many other reds. Reds

for motoring have been talked of for the past two seasons, but until the past few weeks these brilliant hues have been little employed, but now motorists are to have several new shades, such as fire red, aurora borealis, American Beauty, Harvard and Mabelle. Other very new shades which are to be seen much in motordom are the rosewood tones, elephant gray and the entire scale of neutral tans and browns known by the names of sable, puce and rat. There is a new gray tinged with rose called "Gris Mode," a lovely, bright violet called "peach bloom" and "Indian Blue," a brighter and clearer blue. Jade green and the greens in very bright tones are to be in great demand, as will also be



Here is one of the smartest motor coats of the season, posed with quiet elegance. Made of Hudson seal and trimmed with mink. Courtesy C. C. Shayne & Co., New York City.

the darker tones in the bottle greens.

And There Are Trench Coats.

There are some very handsome motor coats being shown called "Swagger Trench Coats," made of sturdy army cloth in military blue or khaki color, with inverted pleats and brass buttons. Army cloth is being used for many of the motor models and tweeds are also in evidence—more so than during the past few seasons. An excellent model made of military blue army cloth has a centre back slot seam which flares open below the waist. A narrow belt of patent leather passes in and out of piped button holes, which are inserted at the normal waist line. Flat, patch pockets on both skirt and waist portions have narrow cuff flaps buttoned over.

There are many new ideas to be presented in motor millinery. Chenille straw, which is a clever reproduction of

chenille braid, is to be used a great deal, as it is soft and pliable and may easily be draped into any shape. Moufflon straw is another new comer for motor millinery. A new idea is the motor hats of gingham and linen which come in quaint little mush room and poke shapes and are trimmed with applied fruit or floral decorations.

New Millinery Shapes.

In shapes for motoring the Hindoo turban represents the last word. It is, as the name expresses, a draped affair, ornamented only by a quaint jewel decoration. A veil of chiffon cloth is draped to hang down the back, but may be brought up about the face and neck when required. A new motor hat is of a closely fitting shape in sand colored satin with a trimming of self-toned ribbon made into smart upstanding loops at the back. Another coquettish little motor model is of bright green grosgrain ribbon. It is simply entirely little loops of the ribbon and while simple to describe it is really a subtle and chic creation. A sea green satin has a trimming of chenille looped all around the crown and finished off in a cluster at the side. Fitted turbans setting well down on the eyebrows are being worn almost exclusively in the South for motoring. Falling from the crown and also wrapped about as the only trimming are two long scarf-like ends of Crepe de Chine finished with narrow silk fringe. These long ends are used as a veil while in the motor.

Hoods at National Show.

The motor hood, which had so great a popularity before the day of the enclosed car, has returned to fashion with much enthusiasm. At the recent automobile show in New York City members of the social world came to the show hooded, both in the afternoon and evening. The hoods are made astonishingly like Little Red Riding Hood's bonnet and are of fur, velvet, or any of the soft, velvety wool materials. Others were made on the order of Red Cross nurse's cap, fastening at the back, with broad scarfs of velvet and fur that protect the neck above the line of the wrap. One model is of Italian blue chiffon velvet, trimmed with bands of gray squirrel and tied with long gray velvet ribbons. Another is of palm green velvet with a



Motor Veil, in all modish shades, made of a strong octagon mesh over the face and the rest of cloth. Long floating ends of chiffon may be brought entirely over the hat and face. Courtesy Franklin Simon & Co., New York City.

ruching around the face of amber colored chiffon and perky little bows of amber grosgrain ribbon placed near together all the way around. A strap of green velvet buttoned snugly under the chin. A bonnet of Hudson seal is perfectly plain, but has long velvet ties of scarlet. Many of the hoods worn on Society night at the show were made of chiffon or crepe, trimmed with tiny flowers or ostrich pompons. Some were of gathered tulle in three or four colors, one layer superimposed on the other to build a rainbow foundation.



These Models Show the very newest and best for sports wear. The model standing shows a skirt of Roshanara crepe and the very new tucked front shirts and silk sweater. The other is a dotted Mandarin crepe skirt, linen blouse and sleeveless wool sweater. Posed by May Farbe and Anne Orr.

PLATE 15.

WOODEN GARAGE FOR SUBURBAN CAR OWNER

Permanence and Stability Obtained by the Use of Good Materials
in a Structure Sufficiently Spacious for Freedom of Movement

UNDER present conditions with both labor and materials at almost prohibitive levels, the motor car owner desiring to erect a garage will favor one that calls for a cheap structural material, but which answers all the requirements of a suitable place for housing the car the year around. Whether he be a man of means or not the question of labor will be paramount to other costs and for this reason the type of garage shown here is one of simple form and which could be erected completely by the average man who is handy with the saw and hammer.

It does not follow that a wooden building of this type should have a cheap or shabby appearance and be a detriment to the property, but can be made to harmonize with most any type of dwelling with proper construction and finish, while the total outlay should not exceed \$250 complete if the owner does most of his own carpentry work, and the result is as satisfactory from a utility point of view as if a building costing several times as much had been erected.

It is well for the car owner to build a structure which, when completed, permits him more freedom of movement in the interior than to just squeeze in between the running board of the car and the side of the building. It is not well to be so intensely economical that the cost of making the garage at least two feet wider be allowed to deter the builder from obtaining a garage with sufficient room to work around the machine in comfort. Another disadvantage of too small a building is that when an overhaul of the machine is attempted it means that some of the bulkier components cannot be handled in the building.

Permanence and stability are obtained by the use of good materials, hardware and paint and a solid, well constructed foundation and floor are valuable toward the same end. The foundation walls are 19 feet nine inches in length, 15 feet wide and nine inches thick, extending three feet six inches below grade and four inches above grade. For the walls a mixture of one part cement, two parts sand and five parts gravel or crushed stone is strong enough. After the excavations for the drain and piping have been made the ground within the walls should be tamped down hard and covered with a thin layer of cinders preparatory to laying the cement floor, which should consist of another layer of concrete three inches thick, composed of the same mix-

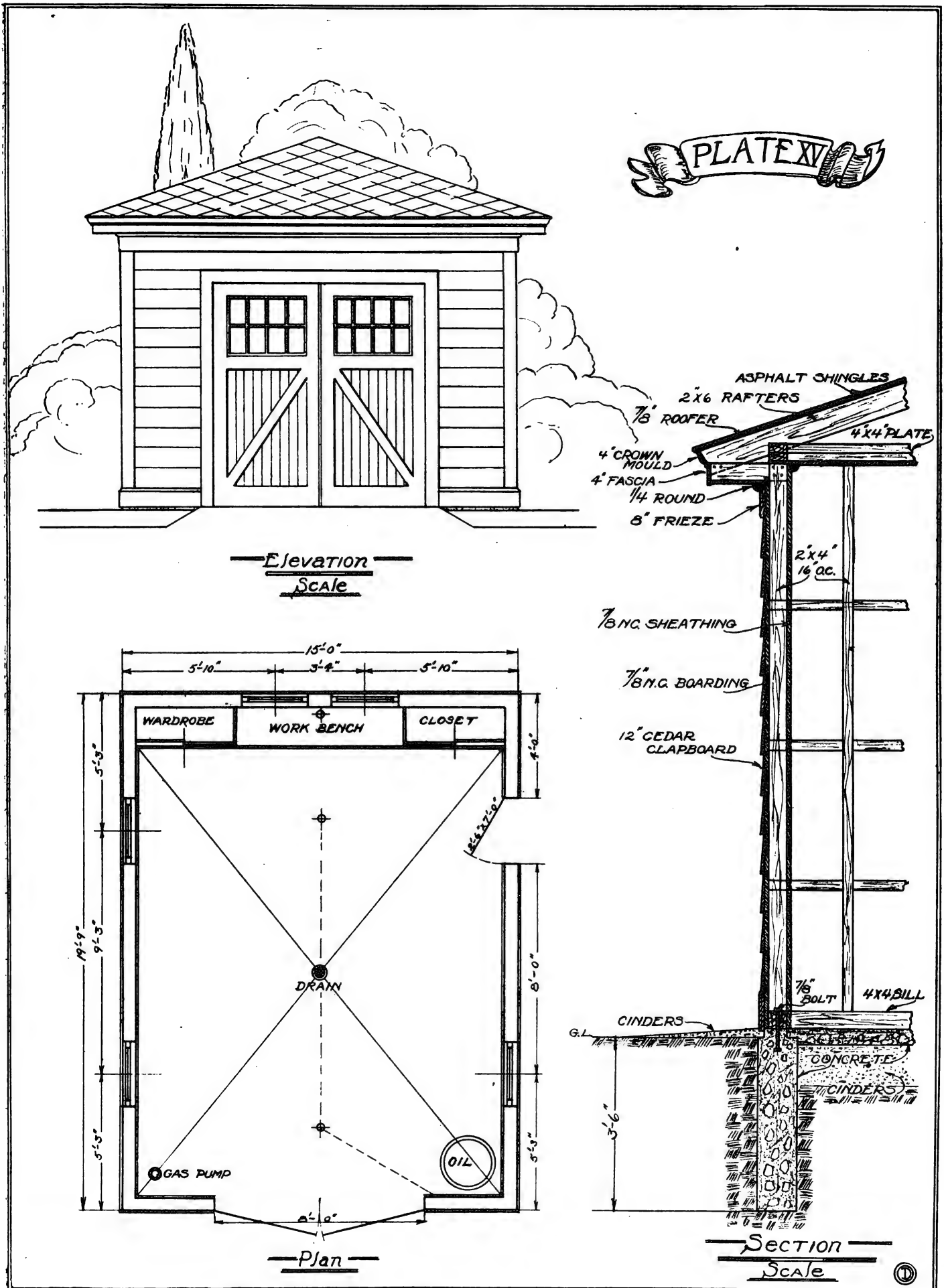
ture as in the walls, and a surface layer one inch thick of one part cement and two parts sand.

When the walls are cast eight-inch bolts seven-eighths of an inch in diameter should be placed in the mixture so that the threaded end will extend $4\frac{1}{2}$ inches above the surface. These are used to secure the sills to the foundation.

The frame of the building is erected on sills four inches square and is built of 2x4 inch studs, 11 feet long, 2x6 inch spruce rafters on 4x4 inch plates made by nailing two 2x4 inch joists together as shown in detail. The walls are of seven-eighths inch boarding and 12 inch redwood clapboards laid 10 inches to the weather. The roof is of the hip type and is made of 2x5 inch jack rafters and 2x6 inch spruce rafters, with seven-eighths inch North Carolina roofer and covered with green asbestos shingles. All exterior work is of seven-eighths white pine stock, including cornice, corner boards, base boards and other exterior finishing material.

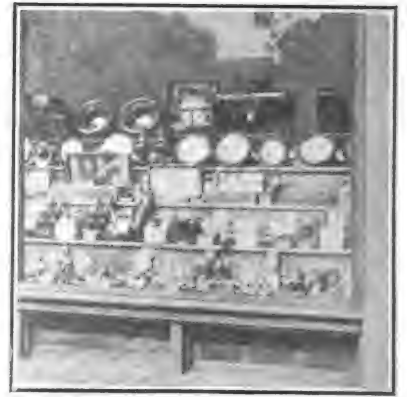
The appointments of the garage are complete, as shown in the plan, including wardrobe, work bench, closet, separate entrance, ample doors and five windows for light and ventilation. The windows may be hung or hinged as owner desires, but will be more attractive if made of sashes with small panes like those shown in the door. The main entrance, which is eight feet in width, gives ample clearance in driving in and backing out without danger of hitting the sides. The door way is closed with two swinging doors, $2\frac{3}{4}$ inches thick, with panel windows in the upper halves.

The interior walls and ceiling should be plastered or finished off with wall board as desired by owner. If it is to be located in a cold climate plaster is the preferable material, as it seals up the interior against the weather and makes it more economical to heat and eliminates the danger of freezing inside. It is the best plan to heat a garage of the wooden type from the house system if either steam or hot water are used and the radiating pipes should be hung along the walls or a series placed under the work bench, where the heat would have a tendency to concentrate, and directly in front and upon the radiator of the car on cold nights. This plan would call for less heat and give better assurance against freezing at all times, besides heating the end of the building, where a person would spend most of his time in working.





Accessories Department



TRANSMISSION LININGS.

In the December 25th issue of the Automobile Journal an editorial appeared giving description of the Advance Cork Insert Transmission Linings for Ford cars. The price quoted of \$1 was a typographical error and should have been \$3 per set of three.

A brake lining that would engage smoothly without the customary grab or chatter has long been sought by the motorist and such a lining is said to be the cork insert. The cork insert consists of a heavy fabric of great strength, in which is inserted at regular intervals buttons of cork. Cork in itself is an excellent braking material, since it is not affected by oil or moisture of any kind, nor is it appreciably worn by ordinary friction. Alone, however, it soon would crumble away, and so it is inserted in the heavy fabric which keeps it together.

The braking action, as well as the clutching action of this lining, is said to be smooth and positive, the cork exerting an even pressure upon the metal surfaces of the brake or transmission drums. It is put up in sets of three bands for the Ford car transmission.

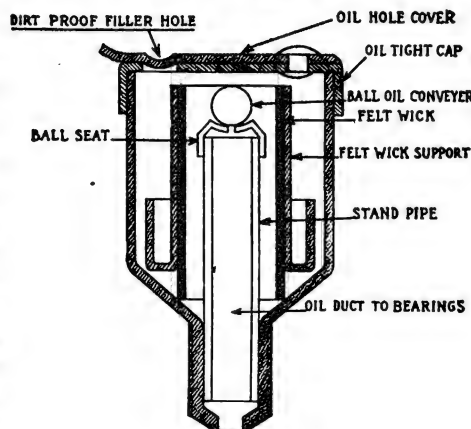
Manufactured by Advance Automobile Accessories Corporation, Dept. K., 3-1, 56 E. Randolph St., Chicago, Ill. \$3 per set of three.

SHURNUFF MANIFOLD.

Many Ford car owners are face to face with the difficult problem of efficient carburetion during the winter months. Their engines are apt to skip or stop altogether unless they adopt some means of keeping the power plant warm.



Set of Transmission Linings.



SECTION
Lubrik-Oil Cup and Sectional View
of Same.

Shurnuff M COMBINATION
MANIFOLD



Shurnuff Combination Manifold, as the name indicates, is a single casting, which comprises both the intake and exhaust passages. By this method the ingoing gas is heated by contact with the exhaust manifold walls, being vaporized by the extreme heat, and thus has a tendency to be more explosive when in the cylinders.

Through the casting are holes which fit over the standard Ford studs, so that no alterations to the engine are required. The manufacturers claim a saving in fuel, as well as a smoother running engine with this installation.

Manufactured by Shurnuff Manufacturing Co., St. Louis, Mo. Price, \$9.

SIGNALING DEVICE.

With the increase of traffic comes the need of some signaling device by which a driver can make known his actions to the drivers of cars behind him. A device has recently been perfected and patented by John L. Gleason of Jamaica Plain, Mass., which seems to solve the problem.

Upon the rear of the car is mounted a box, fitted with three lights and two shutters. The centre light serves as a tail light, while upon each side are lights which under ordinary conditions are covered by the shutters. When the driver wishes to turn to the left or right he pulls a lever, which actuates and operates either the left or right light shutter and indicates to any person or driver at the rear just what to expect from the car ahead.

The closing of the shutters is accomplished by spring devices, while a glass covered opening at the end of the box allows the light beams to illuminate the number plate. The whole device is very simple and said to be very efficient.

Anyone interested in this patent or marketing of the device is requested to write John L. Gleason, Jamaica Plain, Mass., for further particulars.

LUBRIK-OIL CUP.

A device called the Lubrik-Oil Cup is something distinctively different in the lubricating line. This oil cup consists of an outside steel, sheradized or nickel

plated body fitted with a heavy oil tight cap in which is cut a filler hole, protected by a spring cover. In the body is fitted a so-called stand pipe upon the top of which is a ball. Surrounding the stand pipe is a circular shaped wick, supported by a heavy piece of felt. The device is filled with lubricating oil through the hole in the cover and every motion of the car throws the ball against the wick oil feed, which is kept supplied with oil, as long as there is any lubricant in the body, by capillary action.

From the ball the lubricant runs through the stand pipe oil duct into the bearing. Beyond the filling of the oil reservoir every two or three thousand miles, no attention is said to be necessary, the amount of oil necessary being furnished by the wick. The oiler may be applied to any automobile or bearing surface where there is sufficient movement to agitate the ball oil conveyor. A feature of the device is that it functions only while the bearing is in operation.

Manufactured by Warnola Manufacturing Co., 73 Wooster St., New York City. Prices, steel, 50 cents; sherardized, 70 cents; nickel plated, \$1.

PORTABLE ELECTRIC DRILL.

It is frequently desirable to take the drill to the work rather than pulling the machine to pieces and taking it to the drill. The Cincinnati portable electric drill is made for $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{2}$ inch drill capacities, and shifting a wing nut the speed can be changed from high to low.

This drill may be obtained wound for direct or alternating current and also with universal winding for use on either current. The armature is built of sheet steel, thoroughly insulated and mounted on ball bearings. Field coils are form wound. The motor windings are fully enclosed, dirt and dust proof, and all working parts are protected; the coils are separated from the gear case by an aluminum plate, which prevents oil and grease from reaching them.

Manufactured by the Cincinnati Tool Co., Norwood, O. Prices upon application.

TELL-TALE PISTON RING.

Of late there has been more or less trouble from excess carbon formation and oil escapement into the explosion chamber of gasoline engines. To prevent this excess oil leakage and to decrease liabilities of leakage past the pistons the Tell-Tale Piston Ring has been designed.

This ring is made of a metal which is capable of withstanding a great heat without losing its tension. Each ring is individually cast and retains its scale or resilient strength when finished. The wearing edge is turned and so adapts itself to the cylinder in which it runs.

Around the outside is turned a shallow groove, or wiping chamber, which is designed to collect any surplus oil and



Tell-Tale Piston Ring.

allow it to escape into the crank case through vertical channels cut to the groove at intervals. The joint is of the familiar square lap type, in effect two rings, but only one casting.

Manufactured by Vulcan Machine and Tool Co., St. Louis, Mo. Write for prices.

ROFILO.

Rofilo is an ingenious little device for the elimination of work in grinding valves. As every repair man knows, grinding valves is a long task, requiring both skill and patience to get satisfactory results. This device consists of a steel frame carrying 24 small rolling files, set in the frame at the angle of the valve face. Rofilo is placed in the valve seat and the valve is replaced with its face resting upon the files in the cage. The valve is then revolved in one direction at high speed with an electric or hand drill. The files roll between the valve and seat faces and the cutting action results from the tendency of the files to adjust their single peripheral speed to the many peripheral speeds along the conical face of the valve and seat. There is the same amount of slippage between the files and the seat, with the result that the cutting action on both surfaces is simultaneous and equal, resulting in a smoothly cut or filed surface on both the valve and seat, the two surfaces being parallel.

The manufacturers claim that there is absolutely no chance for the cutting of grooves in the faces, and that after Rofilo is used, grinding is very seldom necessary, since the tool both resurfaces or refaces the two members and grinds them at the same time.

Distributed by the Rofilo Sales Co. 1317 L. C. Smith Bldg., Seattle, Wash. Write for prices and literature.



Application of Windshield Cleaner

PERFECTION WHEEL LINER.

A device designed for the owner, as well as the garage or repair man, is known as the Perfection Wheel Liner. As every driver realizes, wear on front tires is increased to a great extent by wheels that are out of alignment, so that it is to the interest of the motorist to keep his front wheels in perfect alignment or he will have trouble from tires.

The Perfection Wheel Liner is constructed of cold rolled steel and fitted with two indicating scales and two forks, one on each end. Between the two scales, which indicate in degrees the camber of the wheels, is a third scale, which gives the distance between the ends or sides of the wheels. As can be seen from the illustration the device may be used to get the exact distance between the tops and bottoms of the wheels, at the front or at the rear. Comparisons with measurements taken of the front wheels and similar measurements taken of the rear will indicate any out of alignment that might exist. Spring tension automatically holds the gauge tight against the felloe of each wheel.

Manufactured by International Motor Products Co., 2023 S. Michigan Ave., Chicago, Ill. Write for price.



Perfection Wheel Liner.

WINDSHIELD CLEANER.

Many accidents occur which might have been avoided had the driver a clear view of the road ahead. A windshield clouded by rain or snow constitutes a serious hazard, and, to a certain extent is as bad as temporary blindness to the operator.

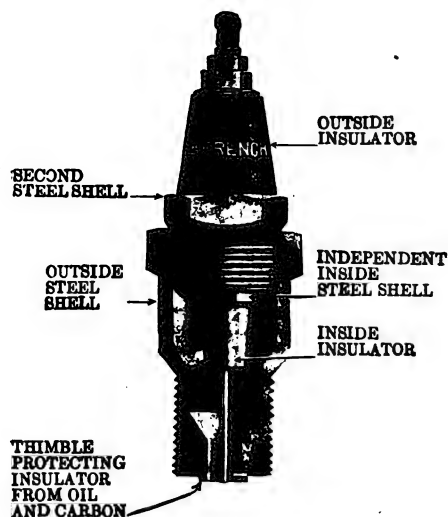
The Ever Good Windshield Cleaner is a neat little device which may be slipped over the top rim of the windshield. Pressing against the outside of the glass is a long rubber blade. As the device is drawn by the operator across the panel, moisture or snow is squeezed from the glass by the pressure of the rubber. When the cleaner is drawn back the rubber blade reverses, thus making the cleaner double acting.

It is made in black steel stamping with nickel finish and is inconspicuous on the shield.

Distributed by Emil Grossman Manufacturing Corp., Bush Terminal Factory 20, New York City. Write for prices.



The Rofilo Valve Refacing Tool.



LAFRENCH SPARK PLUG.

The LaFrench Power Spark Plug, which has just been placed on the market, is one of unusual design, which is built up with telescopic tapered fittings assembled from the bottom up by hydraulic pressure, a feature which is said to make the plug absolutely compression tight.

The insulator is a mica composition, said to be unaffected by heat, moisture or oil, and enclosed in an independent inside steel shell. At the bottom of the plug there is a unique thimble arrangement which is devised to reduce to a minimum the accumulation of carbon within the plug.

The complete plug is of two independent parts, which can be taken down and cleaned in the most simple manner.

Manufactured by the La French Power Spark Plug Co., E. First Ave., Columbus, O. Write for prices and further details.

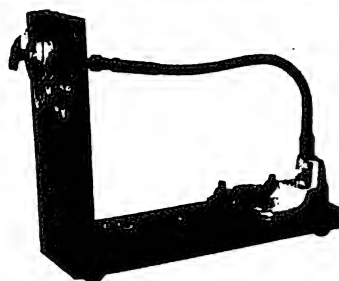
H. & H. STEEL LOCKER.

An employer has a certain responsibility toward his employees and is morally bound to furnish them with some form of locker for their coats, hats, etc. The H. & H. Steel Locker solves the problem of cost as well as space. The locker illustrated is called type B-C, and adds to the attractiveness of coat rooms, as well as provides for spacious, sanitary and safe storage accommodations.

The door frames are made from one solid sheet of No. 14 gauge, cold rolled steel, flanged one inch on both outside edges and formed at the bottom to provide six-inch legs. The back is made of one piece, flanged one inch on both edges, extending from the top to the floor. The sides are bolted to the front and back. The doors are made of No. 14 gauge steel, reinforced with steel channel construction and hung on the frame with three solid two-inch fast pin butts. They are louvered with six openings at top and bottom to admit air for circulation, and if required may be cut with louvers over the whole area. The design of the lockers permits the assembling of practically any number side by side, forming an unbroken surface.

Standard sizes ranging from one foot square and five feet high to two feet square by six feet high may be obtained.

Manufactured by the Hart & Hutchinson Co., 654 Oliver Bldg., Boston, Mass. Write for prices giving requirements.



COMCO AUTO LOCK.

A lock that is said to be 100 per cent. thief proof is now being sold under the trade name of Comco Auto Lock. This device is very simple and is scientifically constructed.

It consists of a gasket like attachment, which is fastened between the carburetor and intake manifold or engine. This gasket is cast integral with the lock mechanism housing and is fitted with a shutter which cuts off all the gas supply to the engine when the device is locked. From the lock mechanism a flexible connection leads to a combination dial on the dashboard which may be set to a great number of combinations.

To lock the device a turn of the combination knob is all that is necessary. No gas can then reach the engine from the carburetor. The manufacturers claim that the device cannot be picked or broken without damaging the engine fittings, and is so simple that it may be operated in the dark by a person familiar with the correct combination. The illustration shows the dealer's display stand, which is furnished to any one ordering 12 or more locks.

Manufactured by Combination Auto Lock Co., 1134 Chestnut St., St Louis, Mo. Standard lock for any car, \$10. Ford special, \$7.50. Special proposition to dealers.



H. & H. Steel Locker.

ELECTROMATIC GARAGE DOOR.

The average garage owner does not like to get out of his car in the rain or a blizzard to open the garage doors. Besides being inconvenient, considerable heat is lost from the garage, as the doors remain open until the driver can get into the car and run it into the garage.

The Electromatic type 10-20 electrically operated door is so designed that it may be opened without the necessity of getting out of the machine. The button may be placed at any convenient point, and when pressed, turns on the current for the garage lights and operates the motor door driving mechanism. Another button conveniently located closes the doors.

Should the electric mechanism get out of order the door may be operated by a hand lever. Both doors are mechanically connected so that the opening of one section also opens the other.

Manufactured by Allith-Prouty Co., Danville, Ill. Write for prices.

STALIT HEATING PLUG.

Difficult engine starting in cold weather is frequently due to the condensation of gasoline vapor in the intake manifold. The Stalit Heating Plug is designed to make starting of a cold engine an easy matter. The exterior appearance is somewhat similar to that of the ordinary spark plug, but its construction is different. It consists of a coil of resistance wire which is heated by the passage of electric current. This device is designed to be placed in the intake manifold and connected through a switch with the battery.

Its operation is as follows: The special switch is closed and left for about a minute, then the engine is cranked, as soon as the engine runs the switch is turned off. The heat generated in the resistance vaporizes the gasoline in the manifold and forms an explosive mixture.

Manufactured by Geo. Staats & Co., 74 Bayard St., Brooklyn, N. Y. Price, \$2.25.



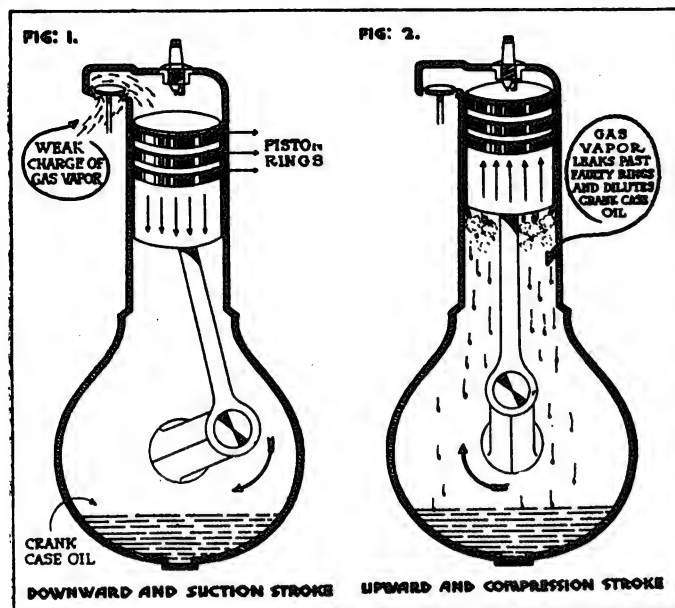
Electromatic Garage Door.

Tracing Troubles Caused by Leaky Piston Rings

Escape of Gas by Faulty Piston Packing Leads To Loss of Power and Damage to the Engine

By PAUL R. BEARDSLEY, Secretary and Treasurer the Piston Ring Co., Muskegon, Mich.

The average motorist does not pay very much attention to his car, except to know how to operate it. When his car is not running smoothly, which is very often the case, he is apt to run it into a garage and tell them to clean the spark plugs, readjust the carburetor, or to leave the instructions, "Fix it



Showing Weak Charge, Leakage and Oil Dilution.

up." Perhaps the spark plugs are dirty and when cleaned the car will run along smoothly, but only for a short time, when the same thing happens again. Most men have a very vague idea what the inside of an engine is like, but if they just gave it a little careful thought and study, a whole lot of engine troubles would be overcome, and this article is being written in an endeavor to explain the important part piston rings play in the efficiency of this unit.

For example—let us take the four-cycle, four-cylinder internal combustion engine, which is the machine almost universally used in automobile construction. We will take one cylinder and show the work that to be done by each one in turn.

The piston has a reciprocating motion, that is, it moves back and forth within the cylinder. Its first action is downward. This stroke is called the suction stroke, because it draws or sucks the gasoline vapor into the combustion chamber, supplying the fuel from which the engine derives its power.

Next comes the upward or compression stroke. The gas vapor is compressed. This pressure amounts to about 70 pounds per square inch. During this compression there is a hot spark in the spark plug, which instantaneously ignites the compressed gas. The explosion and expansion of gas forces the piston downward, and this power is transmitted to the rear wheels, causing the automobile to be propelled.

The last upward or exhaust stroke forces the burnt gases from the cylinder and it is all ready to repeat the same operations.

There is necessarily a small clearance between the piston and the cylinder walls to provide for free reciprocating motion, which must be taken care of, so as to create a uniform contact and pressure, which will make the piston bearing practically compression tight. This is accomplished by the use of piston rings, which fit into grooves in the piston and prevent the escaping of gases.

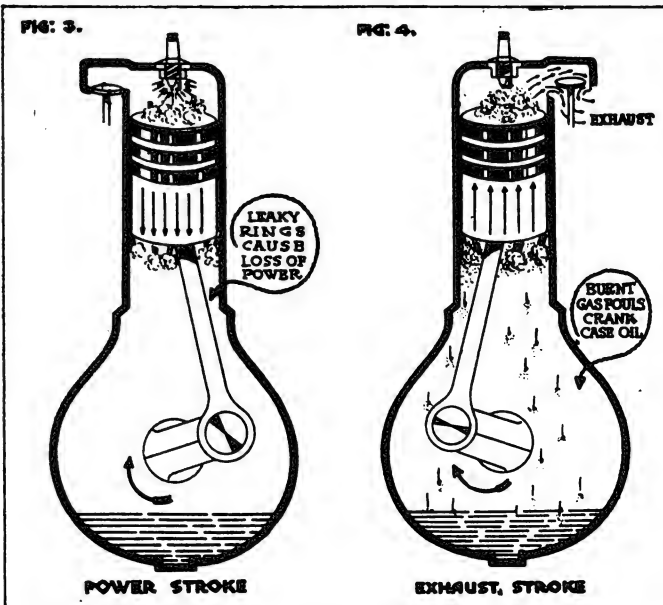
Figure 1 shows the downward or suction stroke of the piston. If the rings are not proof against leakage it is impossible to create a vacuum and consequently a weak charge of gas vapor is drawn into the cylinder head or combustion chamber. This mixture is further weakened by the air which escapes from the crank case past the rings into the combustion chamber, resulting in decreased power. This is a very ordinary trouble and the average motorist instead of equipping his motor with the proper piston rings will readjust his carburetor to get a richer mixture of gas, hoping to overcome this trouble. You can see at a glance that this is mere extravagance.

Figure 2 shows the compression stroke and the importance of the proper piston rings. If the rings leak some of the gas vapor instead of being compressed slips by the rings and condenses and dilutes the crank case oil. Many a car owner has ruined the bearings of his motor because of this trouble, but instead of equipping his car with new rings, he condemns the oil he has been using and seeks another grade. Perhaps the best way to explain the importance of compression is to mention the fact that if the compression is high enough (600 pounds or more per square inch) the gas ignites spontaneously.

Figure 3—The power stroke shows you how easy it is for gas to escape past the piston ring instead of utilizing all its expansive forces on the piston head where it belongs. In this case leaky rings cause a considerable loss of power.

Figure 4—The exhaust stroke shows how, with leaky rings the burnt gas, smoke and soot is not all forced through the exhaust manifold as it should be. This leaks past the rings and fouls the oil in the crank case, or remaining in the combustion chamber results in the accumulation of carbon deposits.

One of the most common and annoying troubles from leaky piston rings is with the spark plugs. Oil leaks into the combustion chamber and being burnt leaves carbon deposits on the spark plug points and also valve seats. To be efficient a spark plug must give an extremely hot spark and this cannot be done unless the points are kept clean. Of course carbon deposits on the valve seats prevent the valves from entirely closing, which cause a great loss of power and make necessary frequent regrinding of valves.



Showing Loss of Power and Fouling of Oil.

Ohio Trade Interests Plan Mutual Welfare

Promote Campaign Among Members and Motorists

A NEW trade plan to promote the best interests of dealers and better service for the motoring public is announced by the Ohio Automobile Trade Association. Within the past month it has developed this plan of organization and operation to meet the extraordinary demands being placed on the retail automobile trade, and its allied trades, the garage and accessory business.

To quote from a pamphlet recently issued from the association headquarters, "the whole purpose of the association is to give a broad and varied service to its members, and to the public." In order to give this service the work of the association has very naturally fallen into two main classes: First, educational work among the members of the association, and, second, educational work among the general public.

The first move upon the part of the association is to organize the entire retail automobile trade of the state (which is defined by the association as including motor car dealers, accessory dealers, garage owners, repair men and tire dealers). On Dec. 1, 1917, the Ohio Automobile Trade Association had something less than 100 members. A general convention was called of all retail automobile tradesmen in Columbus on Dec. 4, 5 and 6, and at this time plans were started for the development of the association along new lines. New officers and directors were elected and a fund of



A. E. Mitzel, Canton, O., President of the Ohio Automobile Trade Association.

\$15,000 was pledged by those interested to carry on the work of the association until such time as it shall become self-sustaining.

Arthur M. Crumrine of Columbus, an advertising and merchandising expert, was employed by the association to draft a plan for the organization of the association along modern business lines. A very complete plan was presented by Mr. Crumrine at a directors' meeting on Dec. 31, and the work of organization under this plan has been started. There have been appointed county directors for each county, and under the county directors, subdirectors for each town.

A thorough canvass of the state by the executive officers of the association

Association to Work for Reliable and Prompt Service

has resulted in a complete list of the persons in the state who are qualified for membership. As a result of this intensive work it is expected that the association will have a membership of at least 1000 by April 1.

As soon as the association is placed upon a firm and self-sustaining basis a standards committee will be appointed by the president. This committee will make a thorough investigation into the standards and practises of operation practised in various sections of the state, and will then recommend to the association a code of ethics and standard practises which will be used by all members of the association. Standard cost systems will be adopted, a uniform system of credit ratings established and a uniform scale of trade discounts established and maintained. In other words, this branch of the association activities means the furnishing to all members of the association of such trade information and methods as have heretofore been available only to those retail tradesmen who were members of one of the great sales organizations of the automobile trade.

It is also proposed by the association that it shall, with the assistance of its merchandising-advertising counsel, educate its members in modern selling methods and modern business practises. This will be done through the maintaining of a bureau which will prepare and distribute to the members suggestions for sales methods, advertising methods, display methods and means of securing publicity, etc. In this way it is thought that the smaller dealers may secure the benefits of the work which is now being done only for those larger organizations in the larger cities. Adequate legal protection for the association is also planned.

When these means for educating and helping the members of the association have been fully worked out and put into effect, it is expected that the association will be composed of members who will be rendering only "reliable, prompt and reasonable service to the public at all times," and that the sign of the association upon the door of a retail establishment will be a guarantee to the public that such service will be rendered them.

When this point is reached the association plans a campaign of advertising and publicity reaching all sections of the state, which will bring to the attention of the general public the things which have been done for their protection in the way of higher standards of business.

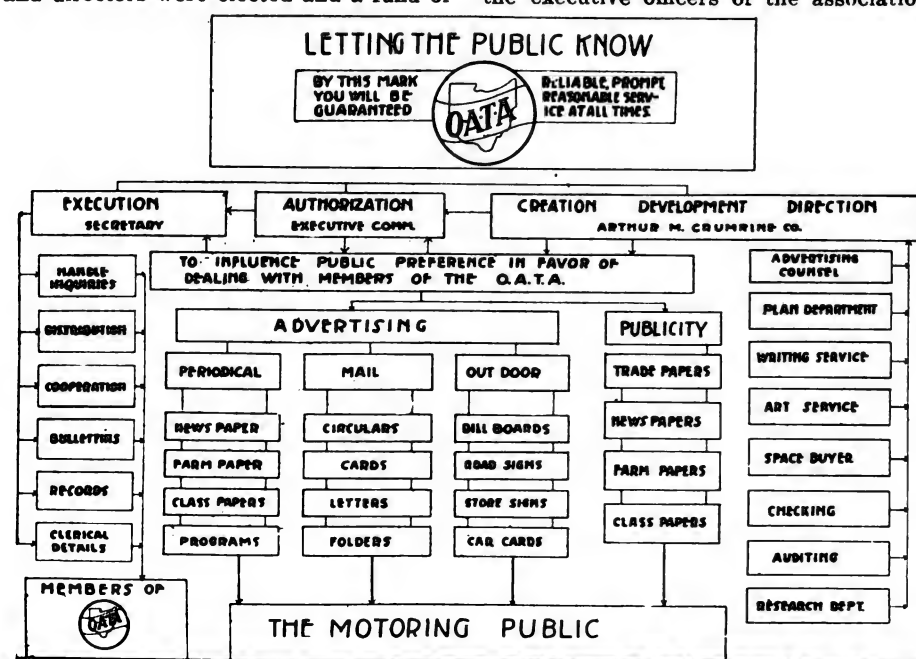


Chart Showing How the Public Preference Campaign Will Be Conducted in Ohio Under the Trade Association Plan.

the keeping in stock of none but dependable merchandise, and the general conduct of business upon modern service lines. "What we are driving at," says President A. E. Mitzel of Canton, "is that when a man takes his car into a service station of any kind, and says to the man in charge that 'there is something wrong,' that he will be assured of the same careful, perfect attention that he now secures when he takes his watch to a jeweler's for attention. We want the public to know that by patronizing only members of the association they will be assured of reliable, prompt, reasonable service at all times."

BRIDGEPORT AUTO SHOW POSTPONED TO MARCH 25-30.

In order to save light and coal, Manager B. B. Steiber of the Bridgeport Auto Show, Bridgeport, Conn., has postponed the exhibition to March 25-30. Holding the show at a later date will give the dealers the advantage of the improved weather conditions to bring their cars over the road. Elaborate de-

Dearth of Trained Men in Motor Industry

Packard Motor Car Company Trains Men to Fill Positions Which Command Big Salaries.

A dearth of technically trained men exists in the automobile industry, according to C. R. Lester, technical service manager for the Packard Motor Car Co. This is especially true, Mr. Lester says, in the automobile service stations throughout the country, where the demand has become acute.

Production of motor vehicles is increasing rapidly. Sales are increasing. Every year sees new thousands added to the ranks of car and truck owners. But there is no comparable increase in the number of skilled men capable of performing or directing service on motor vehicles. The result is a real need for such men and a big field of opportunity open to them.

To meet this need, especially in its own service stations in every part of the United States, the Packard Motor Car Co. has opened a new technical service training school. The purpose of this school is to provide technically trained men for positions at field service stations and also at the factory.

This school is open to all men who have had any automobile experience. Every man accepted for the school will be paid while he is being taught. When he has finished his course a position will be found for him in a Packard service station or at the main factory, when he will be paid the prevailing scale of wages.

"Let it be understood," said Mr. Lester, "that this school is for men of the highest caliber only. Its courses appeal to foremen in automobile factories and others who are ambitious for field service where the remuneration, including salary, bonuses and commissions, runs from \$1800 to \$5000 a year.

"This is the day of opportunity for technically trained men. The motor car industry, constantly expanding with the rapidly growing demand, has provided insufficient skilled men for the inspection, adjustment and repair of vehicles in operation. Few persons realize how rapidly the need for such men has come.

There are not enough skilled men prepared each year to care for vehicles under construction.



New Liberty Roadster.

LIBERTY ANNOUNCES A TWO-PASSENGER ROADSTER.

With five well known body models, four-passenger roadster, five-passenger touring, brougham, landaulet and sedan, the standard chassis perfected by the Liberty Motor Car Co. of Detroit is being continued on all 1918 models. Chief of the two or three slight alterations is the use of an aluminum crank case for the motor. Other features, continued in the new models, consist of a counter-shaft of extra heavy design mounted on three bearings and driven by a fabroid gear made of innumerable layers of silk under hydraulic pressure, extra long connecting rods and cylinders inclosed in a solid cylinder block. The hot spot manifold device making more effective the use of low grade fuel will also be continued in this year's models.

M. L. REQUA OF CALIFORNIA TO DIRECT OIL SUPPLY.

M. L. Requa of California has been appointed director of the oil division of the Fuel Administration by Fuel Administrator Garfield. He announced that he would not outline any steps which may be taken in regulating the oil industry until an investigation of the petroleum situation has been made and further information gathered.

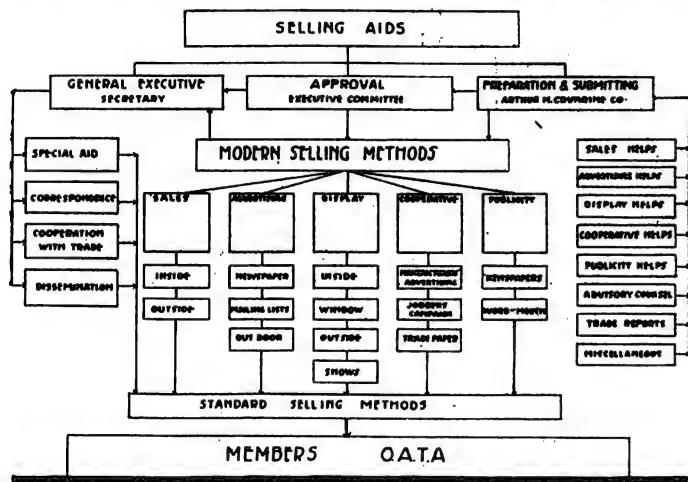


Chart Showing Some of the Proposed Methods for Business Development for the Dealers.

orations are being prepared, including electrical displays and a big line of passenger cars, trucks, trailers and tractors will be exhibited. The show will be staged in the State Armory and Casino daily and evenings.

ELGIN PLANT MECCA FOR SHOW CROWD.

Everyone attending the Chicago Automobile Show was extended an invitation to view the large plant of the Elgin Motor Car Corporation, now completed. The finishing of the new two-story plant, two and one-half blocks long and of the administration building, brought the Elgin plant to an impressive size capable of an output of 100 cars per day, and C. S. Rieman, vice president and general manager of the company, known as the Miracle Man of Motoring, was particularly desirous that other manufacturers and their representatives see for themselves the marvelous growth of Chicago's only successful passenger car manufacturing company.



Sign to Be Placed Over Members' Garage Doors.

The Business Side of the Motor Vehicle Industry

What Several of the Leading Car and Parts Makers, Production and Sales Organizations, and Allied Lines Are Doing or Have Under Consideration

The Chevrolet Motor Co., Flint, Mich., has announced a new price list to become effective on March 1. The present prices and new prices are shown in the following table:

K. Parke; vice president and treasurer, William Passmore; secretary, C. E. Calender; production manager, L. P. Helm; director of sales and advertising, St. Clair Couzens.

David R. Forgan heads the committee.

J. F. Redman has been put in charge of the New England district of the Good-year Tire and Rubber Co., with headquarters at Boston. He will take care of the manufacturers' sales department. He was formerly in charge at Hartford, Conn., and is succeeded by E. J. Smith of Providence, R. I., who in turn is succeeded by O. C. Pahlne, formerly Providence territory salesman.

M. A. Steele, formerly sales manager of the Stephens Motor Branch of Moline Plow Co., has been appointed one of the trade managers of the Moline Plow Co. and will have supervision of several branch houses, as well as the Stephens.

C. Roy Clough has been appointed to the main office of the Moline Plow Co., where he will act as sales manager of the Stephens. He was formerly district sales manager of the Ohio territory. J. F. Hunter will succeed Mr. Clough.

Roy Coffeen is now branch manager of the Willys-Overland, Inc., at Cleveland, O., succeeding M. O. Bridgman, resigned, who was in the position for the last five years.

A. N. Pearson is now with the Denby Motor Truck Co. and will have his headquarters at Boston, Mass. He will be district representative for the New England states.

Victor W. Kliesrath has acquired an interest in the Simms Magneto Co., East Orange, N. J., and will devote his entire attention to the business as consulting engineer. He was for many years chief engineer of the Bosch Magneto Co.

The Tide Water Oil Co., New York City, has established a Veedol department to distribute its products, which are marketed under the trade name of "Veedol." These products were formerly distributed by the Platt & Washburn Refining Co., which has been owned by the Tide Water company for nearly 30 years.

The Staybestos Manufacturing Co., Philadelphia, Pa., has opened branch offices in Detroit and Chicago. W. C. Du Comb, Jr., will have charge of the Detroit office and Edwin E. Coith will manage the Chicago branch.

The Metz Co., Waltham, Mass., is considering the sale of its plant as a means of liquidating its indebtedness. Some parts of the plant will be retained to complete the war contracts that have been taken.

The Detroit Shell Co. has purchased all of the assets of the bankrupt Springfield Body Co., except the wood working machinery, stock on hand, accounts receivable and patents. Barney F. Everitt, acting trustee, estimates that creditors of the Springfield Body Co. will receive 75 cents on the dollar.



Assembling Department of the Plant of the Wisconsin Motor Manufacturing Co., Milwaukee, Wis., Showing Engines on Stands in Process of Completion.

	Old	New
Chassis	\$585	\$625
Touring	635	685
Roadster	625	660

The Haynes Automobile Co., Kokomo, Ind., has issued a new price schedule. The new prices compare with the old as follows:

	Old	New
39-4-passenger roadster...	\$1725	\$1825
38-5-passenger touring....	1595	1725
39-7-passenger touring....	1725	1825
39-sedan	2390	2585
44-7-passenger touring....	2295	2785

An additional advance of \$125 on all Haynes touring models will become effective on March 1.

The Disco Electric Starter Co., Detroit, Mich., which recently went into bankruptcy, has been taken over by the Disco Manufacturing Co., which will continue the manufacture of the Disco starter for Ford cars, as well as other electrical equipment for automobiles. Dean Emerson of the Wagner Electric Co. is general manager of the new company and Harry F. Prescott, formerly with the Saxon Motor Car Corporation, is sales manager.

Benjamin Gotfredson, head of the American Auto Trimming Co., Detroit, Mich., has been elected president of the Saxon Motor Corporation to succeed Harry W. Ford, who recently resigned.

The Olympian Motors Co., Pontiac, Mich., recently held its annual meeting, at which the following officers and directors were elected: President, Fred

The Auto Body Co., Lansing, Mich., will increase its production schedule on Feb. 1, when the daily output will be about 375 bodies. The daily production was formerly about 300 bodies a day, of which number 100 went to the Olds Motor Works. The increase will take care of a contract for 12,000 bodies recently received from the Scripps-Booth Corporation of Detroit.

The Fisher Body Co. has leased the plant of the Ross Automobile Co., which was recently sold to the Shiffman Iron and Metal Co., and will use it for the manufacture of small metal parts.

P. C. Gunion, who has been manager of the Hyatt office at Pittsburgh, has been made advertising manager of the Industrial Bearings Division of the Hyatt Roller Bearing Co., Newark, N. J.

J. F. Dugan has been appointed production manager of the Stanley Motor Carriage Co., Newton, Mass. He was formerly superintendent of the Buick Motor Co., and was also production manager of the Chevrolet Motor Co. at one time. E. H. Delling, formerly with the Mercer Automobile Co., has been made designing engineer with the Stanley company.

The Paige-Detroit Motor Car Co., Detroit, Mich., for the last fiscal year reports profits of \$1,000,000.

The Smith Motor Truck Corporation has been taken over by the creditors' committee that was formed last October to tide it over the financial difficulties it was experiencing with its creditors.

The Reo Motor Car Co., Lansing, Mich., has announced a new price schedule affecting Reo trucks. The model F, $\frac{3}{4}$ ton, has been advanced \$50 to \$1100, while the model J, two-ton truck, remains at \$1800. Model F, with express body, is priced at \$1175, and model J, with stake body, at \$1950.

The Torbensen Axle Co., Detroit, Mich., is preparing to market a line of front axles to correspond with its line of rear axles which heretofore has been the exclusive product of the company. The line will include type OO-2, $\frac{3}{4}$ to two tons; type AA, 1 to $1\frac{1}{2}$ tons; type CC-2, 2 to $2\frac{1}{2}$ tons.

A. W. Sayre has been promoted to the position of district manager of the New York factory branch of the Willard Storage Battery Co., Cleveland, O. He was formerly in charge of the service station at Rochester, N. Y.

BOSCH MAGNETO ANNUAL SALES CONFERENCE.

The annual sales conference of the Bosch Magneto Co. was held recently at the executive offices in New York. Daily sessions were held and both the main office and branch executives spoke in a very optimistic tone of the outlook, especially in view of the present excellent position of the factory, as regarding labor and materials. Mr. F. D. Norman, superintendent, outlined the present favorable conditions.

Hyatt Men Honor Fellows in the Service

Chicago Branch Employees Give Dinner for Associates Who Have Gone to War.

An incident of patriotic interest at least to the employees of the Chicago office of the Hyatt Roller Bearing Co., was a dinner recently given in honor of two of their number who had joined the colors. J. E. Martin is with the mobile ordnance corps and is stationed at Clintonville, Wis., and T. A. Russel is at the aviation school at Ithaca, N. Y.

The dinner was more than a formality, for it was a leave taking of friends who had endeared themselves by qualities that were keenly appreciated. C. M. Eason, manager of the tractor bearings division of the Hyatt company, stated that the company had made a genuine war sacrifice in losing two men who had given it splendid service. The occasion, despite its object, was greatly enjoyed. Those attending the dinner, shown in the accompanying illustration, from left to right, were: Standing, H. O. K. Maister, H. W. Parker, P. W. Gosselin, H. M. Carroll, E. P. Stahl, C. E. Stoddard, F. A. Dean, A. P. Mohr and George O. Helmstaedter; sitting, C. W. Young, J. E. Martin, C. M. Eason, T. A. Russel, W. L. Hliff and J. R. Bateman.

Increased Gas Yield To Result From New Process

New Method Which It Is Claimed Will Triple Production Has Been Offered to Government.

Dr. A. H. Ramage, a member of the Electro-Chemical Society is reported to have perfected a new process by which the yield of gasoline from petroleum can be tripled. The process, which is different from the Burton process, is reported to have been offered to the government for the duration of the war without cost. A company has been formed for manufacturing under the process, according to reports, and a number of prominent men are interested, including Christian Gird of the Standard Parts Co., H. B. Earhart, head of the White Star Oil Co., Detroit; A. E. Leopold, a Chicago capitalist; A. H. Goss of Detroit, E. W. Farr of Cleveland, S. A. Fletcher of Indianapolis, H. B. Smith, Bay City, Mich.; F. C. Finkenshaedt, also of Bay City.

MONTANA'S SECOND ANNUAL SHOW AT GREAT FALLS.

The second annual Montana Automobile Show will be held at Great Falls during the week of March 16 to 20. The exhibition will be held in a large new garage.

RED BANK, NEW JERSEY ANNUAL AUTOMOBILE SHOW.

The Red Bank, New Jersey Annual Automobile Show will be held at the Armory in that city, April 6 to 15, under the auspices of the Monmouth County Automobile Dealers' Association. It is anticipated that the attendance will equal that of last year when over 8000 visited the show under adverse weather conditions.

LOCOMOBILE COMPANY WELL REPRESENTED IN WAR SERVICE.

About 17 per cent. of the force of the Locomobile Co. of America, Bridgeport, Conn., have entered the service of the government. There are at present a total of 336 names on the honor roll, including two who are now majors, three captains, 14 lieutenants and three ensigns. Among the men recently connected with the Locomobile company who have gone into service there is a lieutenant colonel and a major.

RECEIVER FOR SHADBURNE COMBINED MOTORS COMPANY.

John F. Boesinger of Indianapolis has been appointed receiver for the Indiana assets of the Shadburne Combined Motors Co., which is also known as the Shadburne Brothers Co. of Chicago. The application for a receiver was made by Howard Hews of Chicago, who was appointed receiver for the company by the Federal Court at Chicago. He estimates the value of the company's property and equipment in Frankfort, Ind., at \$130,000.

NORTHWESTERN CHEMICAL GIVES FUND FOR SOLDIERS.

Clark G. Griffith, director general of the Ball and Bat Fund, with headquarters at 309 Union Savings Bank building, Washington, D. C., has written a letter of thanks to the Northwestern Chemical Co., Marietta, O., acknowledging the latter's contribution to the fund. The letter, which was addressed to General Manager F. R. Hall, stated:

"Yours of Nov. 20 enclosing check for \$250 as a contribution to the Ball and Bat Fund, received, and the channel it came from I assure you was a surprise. "While we have had quite a few checks amounting to three or four figures, we have none that has given up their Christmas for the benefit of the red-blooded boys who are going to save this great country of ours."



Employees of the Hyatt Roller Bearing Co., Chicago Branch, Give Enlistment Dinner to Fellows Joining the Colors.

Place \$3,000,000 Contract for Wheels

Government Places Orders for Escort
Type with Prudden and Other
Companies.

Contracts for \$3,000,000 worth of escort wheels have been placed with the Prudden Wheel Co. and the Auto Wheel Co. by the government. The Kelsey Wheel Co. of Detroit and the Hayes Wheel Co. of Jackson, Mich., have also received large contracts for wheels of the same type.



J. Crosby White, New Traveling Sales
Representative of J. H. Faw, Inc.,
New York.

FAW APPOINTS NEW TRAVELING SALES MANAGER.

J. H. Faw, Inc., distributing sales specialists in automobile accessories, 41 Warren street, New York, announces the appointment of J. Crosby White as traveling sales manager. Mr. White, who has had an experience of more than 12 years in the automobile accessory business and is very familiar with it from every angle, will start first on a general tour of the territory, covering the southern states.

Several standard lines of accessories are distributed by the Faw company in addition to the marketing of several items of their own manufacture. The latter include the Fawco brands, auto crawlers, ignition wiring assemblies, lamp electrifiers, oil cock wrenches, Lennon light protectors, Red Seal spark plugs and automobile fuses. In the distribution list is found Connecticut switches, Culver-Stearns electric specialties, Eureka valve grinding compound, Fitzgerald Manufacturing Co. gaskets, Ideal hose clamps, Tungsol auto lamp bulbs and Walden-Worcester wrenches.

It has been the policy of the firm for the last three years of confining their

distribution to jobbers of automobile accessories. The Faw sales slogan "For the Good of the Trade" is quite familiar to the field, which, by the new traveling and the firm's advertising campaign, it is intended to carry much further afield than ever. The firm believes in the gospel of standard accessories and quality merchandise and enters the 1918 campaign affording the jobber opportunity to be actuated by its slogan in sales policy.

Moline Co. Merges With Engine Company

Combines with Root & Van Dervoort Engineering Co., Makers of R. & V. Engine.

The Moline Automobile Co., manufacturers of the Moline-Knight motor car and the Root & Van Dervoort Engineering Co., both of East Moline, Ill., have been consolidated as the Root & Van Dervoort Engineering Co., an Illinois corporation. In the past the two companies have been under the control of the same officers and the same interests will continue to operate the merged company, the only change actually taking place being that of the name. The Root & Van Dervoort Engineering Co. has been manufacturing high grade gasoline and kerosene engines under the trade name of "R. & V." engines since 1898, when it was established. In 1904 the company's officials foresaw the big future in the automobile industry and established the Moline Automobile Co., manufacturing the Moline car, which later became the "Dreadnaught Moline." The Knight sleeve valve motor was adopted by the Moline company for its product in 1913, which year the product took the name of the "Moline-Knight" and quickly established a widespread reputation through a 337-hour non-stop run under full load, during which it established new records for power, endurance and economy.

The Root & Van Dervoort Engineering Co. branched out into the manufacture of special munition lathes in 1916 and also took a large contract for eight-inch high explosive shells for the British government, and when this country entered the war W. H. Van Dervoort, president and general manager of the company, made an offer to turn his plant over to the government. This offer was accepted in part and the company is turning out quantities of war material for the government. In addition to filling these contracts for the government during the coming year the new company will continue the production of Moline-Knight automobiles, stationary engines, tractor and automobile motors.

The 1918 line of Moline-Knight cars will include two chassis, one 40 horsepower and the other 50 horsepower, to be known as models "C" and "G" respectively. The touring and roadster types on the model "C" chassis sell at \$1650 and the model "G" touring at \$1985. There is also a sedan model at \$2280.

GARAGES CLASSED AS PUBLIC UTILITIES.

While it has been some time since the motor car was referred to as being in the non-essential class at Washington, the authorities recently received a demonstration of the fact that the public recognizes it as an imperative utility. Attention was called to this fact in a most strenuous manner when Fuel Administrator Garfield failed to include the garages in the earlier exemptions to his fuel order. The first Monday that the order went into effect found many machines marooned in garages on the upper floors, accessible only by elevators, the operation of which had been forbidden under the order. Doctors, salesmen and merchants were unable to secure their machines, with the result that a strong protest was sent to Washington, which proved effective in securing an exemption for the garages as coming under the head of public utilities. It did not take long to recognize that present day business would be stagnant minus the automobile.



The New Plant of the Muskegon Engine Co., Muskegon, Mich., Builder of Muskegon Trucks, in Which Production Was Recently Begun.

E. A. Cassidy Co. Has Unique Place In Sales Field

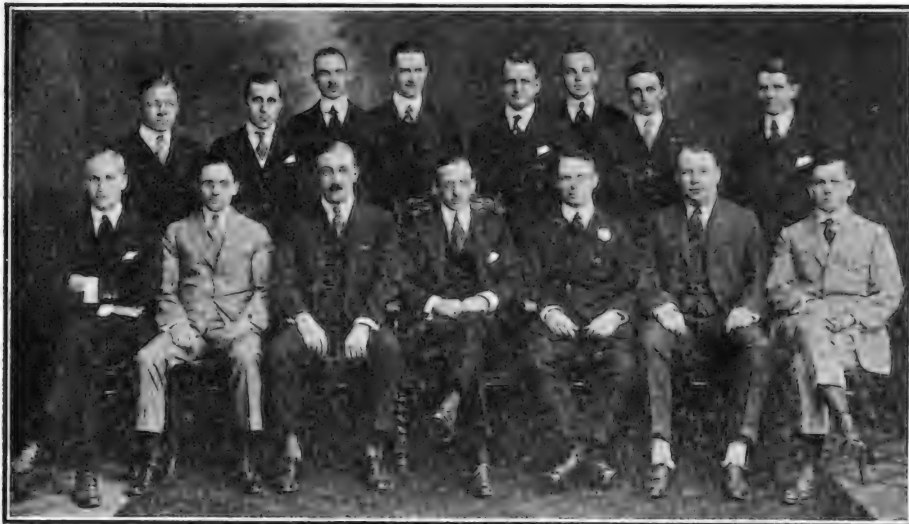
Young Organization Scores Success in Handling Exclusively Over Ten Products.

THE extensive prestige enjoyed in the automobile industry by the E. A. Cassidy Co., Inc., of New York, big accessories and parts merchandisers, is well shown when the second anniversary of the foundation of the company finds them in charge of the sales of several of the leading factories producing automobile accessories in America. This company is the only one of its kind in the country and to the thoroughgoing organization which Mr. Cassidy has built up and energized is due the splendid reputation and prominent place won by it in the automobile accessory field.

of Cassco Engine Driven Tire Pumps; Auto Pedal Co., which makes Twombly Tire Foot Pumps; F. W. Mann Co., manufacturers of the Kimball Ball Bearing Auto Jack, and the G. Piel Co., which produces the G-P Muffler Cutout, the Long Horn, which is standard equipment on many makes of trucks, and the G-P Pedal.

The conception of this unique enterprise came to Mr. Cassidy when he was automobile accessory manager for the H. W. Johns-Manville Co. He saw the possibilities of scientifically organized selling in the accessory field and set about the construction of his organization with keen judgment and characteristic energy. With the formation of a company to act as the sales department for various manufacturers, he immediately gathered around him an organization of men well known in the trade and put into practise the methods which have crystalized into the Cassidy accessories sales plan.

The executive staff is headed by E. A. Cassidy, president of the company, and



Executive and Sales Staff of E. A. Cassidy Co., Inc. Top Row, Left to Right—E. H. Vogt, E. C. Wright, F. W. Carry, J. K. Gilchrist, A. O. Perlitz, J. Klag, H. S. Lyman, C. F. Conn. Sitting, Left to Right—Advertising Manager L. M. Lloyd, C. P. Brewster, Secretary G. B. Gosman, President E. A. Cassidy, R. H. Sleicher, R. G. Ames, A. L. Martin. Gregory Flynn, Formerly Sales Manager of the Rajah Company; Frank Collins and E. P. Hoyle Joined the Company's Staff Since the Above Photograph Was Taken.

The company operates scientific selling campaigns with a vigor and success which makes a marked impress throughout the whole field from factory to consumer. Its talents are therefore exerted to a most appreciable extent in behalf of the accessory dealer and garage man. These effects are certain as the application of the company's expert methods to lines among the best known in the automobile field attest. The company acts purely in the capacity of sales department for their factories. In this work the Cassidy organization takes care of the entire output of the Corning Glass Works, manufacturers of Conaphores, Du Bois Piston Ring Co., makers of the Tenion Ring; Rajah Auto Supply Co., manufacturers of Rajah Spark Plugs and Rajah Spark Plug Terminals, West Side Foundry Co., experts in the manufacture

G. B. Gosman, secretary. L. M. Lloyd is advertising manager of the company in charge of its extensive and effective advertising campaigns. Frequent conferences of the sales staff insure its efficiency and compactness as it is steadily enlarged. With the addition of new lines recently the company has every reason to anticipate a prolonged and most successful season with a record of even more expansions by the time the third anniversary arrives.

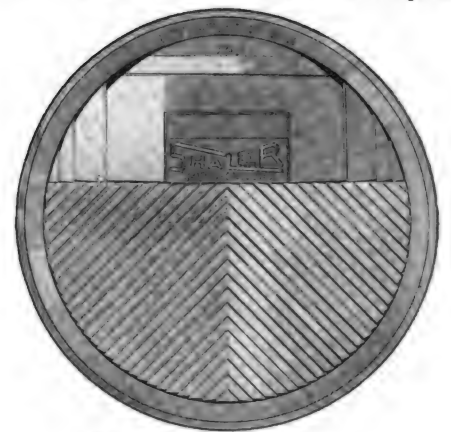
NEW JERSEY MOTORISTS HOLD ENDURANCE RUN.

Seven cars started in the annual 24-hour endurance run of the New Jersey Automobile Motor Club Nov. 30. C. B. Wyckoff of the Essex Automobile Co. of Newark, in an Oldsmobile, was winner.

Lighting the Road with the Shaler Roadlighter

Improved Prismatic Lens Shows the Way, Wastes No Rays and Has No Glare.

Motorists who have complied with anti-glare laws by dimming their lights, who have so often been at the mercy of somebody else's glaring headlights and recall the sensation of helplessness as they slowed down and timidly turned out to pass, with a ditch and its dangers



The Shaler Roadlighter.

hidden alongside, are easily interested in the Shaler Roadlighter. The Roadlighter protects one against the glare of headlights one meets, yet with no glare from his own, to endanger other drivers or violate the law. It is a headlight device that gives this advantage because it was designed for the man who uses it as well as for the man who meets it.

The Shaler Roadlighter is manufactured by the C. A. Shaler Co., 9250 Fourth St., Waupun, Wis. It wastes no beams in lighting the tree tops, but directs them where they are most efficient.


It is a headlight lens that protects the user against the glare from cars that he meets, by throwing on the edges of the road concentrated beams that enable him always to see clearly how far he may turn out without danger of running into the ditch. It throws light far ahead of the car and stronger than that from a clear glass headlight.

It illuminates the full width of the road for 100 to 150 feet so that one can pick the best traveling as one would in daylight. It enables the driver to see the road through fog, rain or snow, without danger from back flare.

Since there is no glare and the rays do not rise above 42 inches from the ground, regardless of the candle power of the bulbs, it makes lights legal in practically any state without dimming. Sign boards may be read in the soft light thrown off at the sides.

Accurate focusing of the bulb is not necessary. The outside of the lens being smooth, no dirt or grease gathers to obscure or cut off the rays.

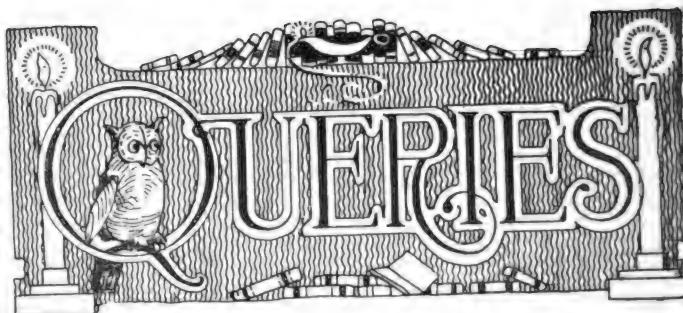
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NOTICE TO READERS.

THIS department contains the Mechanical Editor's answers to readers' inquiries. It is open to every subscriber. If any part of your car is not operating satisfactorily, or if you desire information regarding operating, maintaining or repairing motor cars, do not hesitate to lay your troubles before him. He will answer promptly and fully, either by mail or in these columns, as you direct. This service is free to every subscriber, and is often the means of saving considerable money. Letters should always be signed with the writer's full name and address, and the car or part in question should be properly identified, by mentioning the maker's name, model, year of production or other distinguishing feature. Address all inquiries to the Mechanical Editor.

THE AUTOMOBILE JOURNAL IDEA EXCHANGE.

For the benefit of readers of the Queries column it has been decided to conduct in this department a more widespread interchange of ideas. To this end the attention of readers is invited to the following question:

WHAT METHODS HAVE YOU USED IN REPAIRING CRACKED WATER JACKETS, CYLINDERS OR CRANK CASES?

To the writer of the best answer to the above question \$2.50 will be paid. For the next best answer \$1 will be paid. The best answers received will be published in the second issue after the appearance of the question in the magazine. Answers to the question should be in the hands of the editors by the 18th of February. The contest is open to every one.

LUBRICATING AUTOMOBILE SPRINGS.

(J. C. Schwingle, Niagara Falls, N. Y.)


Best Letter.

From an experience covering about 3½ years with three different makes of automobiles and from the one extreme of hot weather and dry, dusty country roads to the other extreme of slush and mud encountered, from the usual January thaw through the snow and cold weather of a particularly raw February and the deep mud and sloppy snow of our northern March, I have come to the conclusion that there is but one really satisfactory spring lubricant.

I have frequently seen advice given to new beginners by Query Departments of automobile magazines to the effect that a mixture of kerosene and graphite made into a heavy paste and applied between the spring leaves would do the trick. Still other trouble "fixers" would advocate the use of graphite and lubricating oil made into a heavy paste and applied in the same place. Either one of these mixtures will work for a while, but as there is nothing to prevent the oil in either case from drying out or mixing with road dust or mud and thus leaving the graphite alone to do the lubricating, it must be apparent that if one is to enjoy the comforts of well lubricated springs for a very long time at a stretch he must use some lubricating agent that will be less fickle than either of the oils above mentioned. It is a disagreeable enough job at best to crawl under a machine to lubricate the springs and this fact probably accounts for the very little attention given by the average owner to his springs even though they do squeak and squeal, for that is their way of telling you that they need attention. It is my opinion gleaned from several years of observation and experience that the average automobile owner seldom if ever thinks of his springs as being a part of the "machinery" of his car, and

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BALL BEARINGS**



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Stamina
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**TIMES BUILDING
PAWTUCKET, R. I.**

(When Writing to Advertisers, Please Mention The Automobile Journal.)

if he does occasionally happen to think of them as requiring a little attention he gets his oil can and gives them a squirt here and there and then forgets them.

I do not know of any other one thing about an automobile, outside of the engine and tires, that will give so great returns in riding comfort and peace of mind as will careful and painstaking attention to the springs of his car whether it be a flivver or a higher priced car. My first experience was with one of the former class of machines and it was through my almost constant efforts to keep that machine "easy riding" that I discovered how to accomplish that highly desirable result without having to take every Saturday afternoon to "grease her up."

When it is remembered that the springs of a car are designed so that each leaf does its share of absorbing the road shocks and that in order to do that the leaves must work freely on each other, it can be seen that in order to derive the maximum of efficiency from the springs, as well as to prolong their life, they must be kept free from rust between the leaves and the leaves must be free to slide upon each other to the greatest possible extent.

In casting about for some heavy material with which the graphite could be mixed and which would not evaporate or run out and leave the dry graphite to work out from between the leaves, I discovered a heavy graphite spring grease that will not melt under hot summer temperatures or dry out and that will also keep mud, dust and water from working in between the leaves. I do not know whether this grease is on the market or not, but the small quantity I have was procured from the Acheson Graphite Co. of this city. The grease was very heavily charged with graphite, which was depended upon to do the lubricating between the leaves, while the heavy grease itself keeps the dangerous foreign matter from getting in to do its troublesome work between the spring leaves. I bought a spring spreader of the screw type and after jacking up the body of the car at one corner so as to relieve the springs of their load at that point, I proceeded as follows: Remove the spring clips and with the spreader before mentioned separate the leaves, one pair at a time, and with kerosene and a cloth remove all old grease if any remains from a previous greasing, then if there is present any rust remove that with fine emery or sand paper, again wiping the surface of leaves with an oily cloth to remove the grit, after which with an ordinary putty knife cover the cleaned surface of the leaves with an even coating of the above mentioned graphite grease. It will, of course, be necessary only to cover one of two adjoining surfaces. Remove the spreader and proceed with the other leaves in the same manner until all are thoroughly greased, after which be sure to replace the clips and tighten same up before removing the jack. Do not scrimp on the grease, but cover the entire surface of the leaf, as the grease that will squeeze out from between the leaves after the jack is removed can be scraped off and returned to the can to be used another time and is thus not wasted. This grease to give best results should be of about the consistency of putty and to insure lasting results should not be thinned down with oil before using.

The greatest distance that I have covered in any one year with my machine was about 8000 miles, and I found that one application of this grease lasted that length of time and was still making riding easy. It is my judgment, however, that the springs should be treated about every two to three months and the resultant easy riding on lively springs will more than repay the owner for his trouble.

Of course instead of going to the expense of buying a spring spreader, one may use a heavy screw driver or a cold chisel, but if nervous energy is worth anything then a dollar or so invested in this little device will soon pay for itself in time and jarred nerves saved, as well as service rendered, but in this, as in all other tools or accessories that you buy, it pays to spend a little more money and get the best—it is the cheapest in the long run.

I believe that if the proper care of springs were properly impressed on owners that there would be far less need felt for so called shock absorbers on light and medium weight cars, although those who want to load up with all kinds of accessories of course would still be enough in the majority

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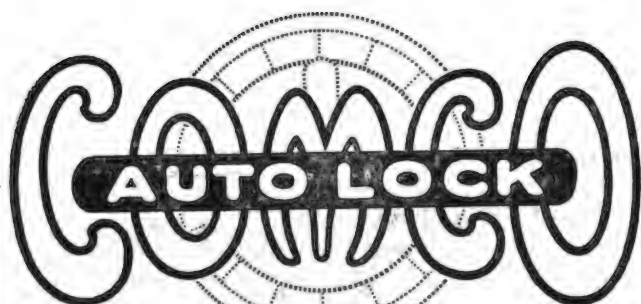
Zenith Carburetor Co.
New York Detroit, U. S. A. Chicago

THE MOTOR TRUCK

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A magazine for business men devoted to the promotion of highway haulage efficiency. It is the national authority of vehicular transportation.

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Times Building Pawtucket, R. I.



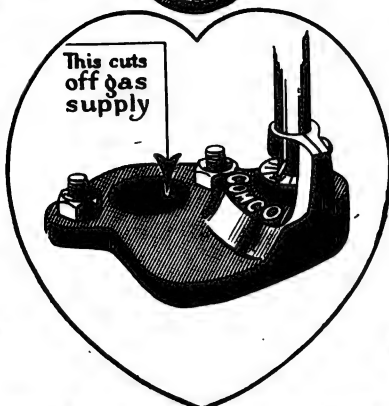
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Automobile—**

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car-
buretor**

**Write
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**This cuts
off gas
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wholly to the owners of passenger
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***A quality magazine with prestige
and circulation that brings results
to advertisers.***

**TIMES BUILDING
PAWTUCKET, R. I.**

to afford a very comfortable living for the multitude of side line dealers whose only interest is to sell an unnecessary extra.

NOTE.—We do not doubt but that any extra heavy cup grease, well filled with graphite, would answer the purpose for lubricating the springs.—Editor.

LUBRICATING THE SPRINGS.

(R. L. Prindle, No. Abington, Mass.)

Second Best Letter.

The lubrication of springs is often neglected by the average driver, who pays no attention to them until they squeak and cause hard riding, a condition brought about by the collecting of rust between the leaves. In order to prevent this the leaves should be greased every month and thoroughly cleaned once every season.

Carefully remove all dirt or grit from the springs, shackles and clips with a stiff brush dipped in kerosene, then wipe them dry. Jack up the frame and remove the weight from the springs. After the clips have been loosened spread the leaves apart with a cold chisel and hammer or special tool, made for this purpose and obtainable at any repair shop or supply house.

If the leaves are rusted and the rust cannot be scraped off with the springs on the car they must be removed and cleaned with fine emery cloth or sand paper.

Prepare a thick paste of powdered graphite and oil or graphite grease and spread it between the leaves with a thin knife or hack saw blade. The excess grease forced from between the leaves as the weight is applied to the springs should be wiped off.

Frequent applications of graphite, using the above method, will keep the springs in the best condition, will pay dividends in easy riding and save money by preventing spring replacements.

SLIPPING CLUTCH.

(M. R., Washington, D. C.)

I have been having considerable trouble recently with the clutch on my car. This clutch is of the cone type and covered with leather. Under ordinary conditions, when under a load, the engine seems to run ahead of the car, caused by the slipping of the clutch. Will you kindly give directions for remedying this trouble?

The trouble may be traced to weak clutch spring tension or faulty clutch facing. The latter is the probable reason if the trouble is recent.

As a general rule wear of leather facing in a cone clutch is negligible if the clutch is given proper care and usage. Slippage is nearly always due to the smoothing over of the leather surface, because of the penetration of oil and dirt.

If the clutch fabric can be reached with a brush it should be given a thorough cleaning with kerosene oil and scrubbed with the brush until all of the surface oil and dirt has been removed. The clutch leather should then present a smooth even surface for contact, though, if left in this condition would soon dry up and again become inoperative.

While the leather is still soft from the kerosene treatment, soak it well with neatsfoot oil, giving it as much as it will absorb.

If the leather has worn trouble frequently arises from the wearing of a shoulder on the rear edge of the leather. When this occurs the clutch cone does not engage with the flywheel the full surface of its face and it is necessary to file or cut away the shoulder before engagement will take place.

If after cleaning the leather it still fails to engage properly, the clutch spring or springs should be examined and adjusted more tightly. Some disc clutches have a number of springs, each of which should be tightened an equal amount to secure smooth engagement. Other clutches are fitted with a single spring, usually at the centre. The latter type may have provision for adjustment or not as the case may be. Where no provision is made for adjustment the placing of shims or washers between the spring and casting accomplishes the result.

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Maxwell Owners

Does your motor always hit on four?

Do not blame your carburetor, or your ignition system, or your valves if your motor does not perform as it did at first, *but look to your spark plugs.*

A set of *AC Titan* plugs will make your car run more smoothly than it ever did because it delivers the *entire* spark instead of losing most of it through the insulation.

AC SPARK PLUGS

The Standard Spark Plug of America

Champion Ignition Company
Sole Manufacturers Flint, Michigan

DELCO IGNITION COIL. (S. E., Detroit, Mich.)

I have a Hudson car, equipped with a Delco starting, lighting and ignition system. I find that the platinum breaker points burn out rather rapidly and I have an idea the trouble is either in the coil or condenser. How can I test the coil and the condenser? Where is the condenser located on this machine?

The condenser on this system is located on the timer-distributor unit, just below the resistance coil, and is probably at fault if the breaker points burn out rapidly.

To test the condenser remove it from the unit and connect it in series with the storage battery and a six-volt lamp. If the condenser is punctured or short circuited the lamp will light, indicating a passage of current. A condenser is composed of a number of sheets of tinfoil, the alternate sheets being connected much the same as the plates of a storage battery. When new the condenser allows no passage of current through it.

If the condenser is found to be in good condition examine the breaker box mechanism and setting. The contact points should be dressed with a fine file or piece of sand paper until the contacting surfaces are perfectly parallel and flat. The engine should then be turned until the breaker arm rides upon the top of the cam. In this position the distance between the breaker points should not be more than .018 or less than .01 of an inch.

The coil is of the non-vibrating type and should deliver a spark from the secondary terminal at least half an inch long. Connect one terminal of the storage battery with one of the end binding posts on the coil. Place a hammer or other heavy metal object near to the secondary coil terminal on the side of the coil and snap the second battery wire rapidly across the other primary binding post on the coil. A spark should leap from the coil terminal to the metal object: To prevent any danger of shock to the operator, the metal object

should be connected with a short length of wire to either of the primary coil binding posts.

Too excessive a spark gap in the spark plugs often results in the burning out of the breaker points. The correct spark plug setting should be between .025 and .028 of an inch.

SPRING LUBRICATION. (R. S. T., Marcy, N. Y.)

Do you think that full lubrication of automobile spring leaves is to be advised? Does it tend to lengthen the life of the spring, and if so, why is it that springs frequently break even when they are lubricated?

Engineers agree that the efficiency and life of a spring is increased by lubrication and practically all of the cars now being put on the market have their springs fitted with lubricating devices. Great care is used in manufacturing spring leaves to machine and polish the surfaces smooth and so reduce the friction to a minimum.

One prominent manufacturer makes a claim that a spring will not break if properly lubricated. This manufacturer puts on the market a spring lubricating device and guarantees to replace any spring that breaks within two or three days, or longer, after the installation of the device.

What is applicable to one leaf of a spring, is, in a measure, applicable to all, for each leaf is designed for its particular position in the assembly.

Under a light load the tension at the centre of the leaf is at a minimum; this tension increasing toward the ends because of the slight curve of the spring. As the load is applied the tension at the ends increases and the tendency of the leaf to straighten causes the ends to slip along the leaf below, distributing the strain throughout its own length and along the next leaf, which in turn has a similar action against the next leaf.

Should the ends of the first leaf be held by friction so that they do not slide readily along the next leaf, the strain will be concentrated at the middle and not properly distrib-

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No Day Too Cold for POLARINE

The Standard Oil for All Motors

Polarine Oil gives mid-summer lubrication in mid-winter weather—maintains the same efficient film of oil between cylinder wall and piston. Heightens compression—lowers engine heat. Always high-grade—dependable.

And for quick starts, snappy pick-ups, no matter what the season, use SOCONY Gasoline. Pure, uniform, reliable.

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uted either throughout the top leaf or those below it.

In many cases, particularly in racing machines where maximum efficiency is desired, the springs are covered by rubber or leather boots which have been packed full of grease and oil.

Like anything else springs are apt to be mechanically imperfect in some cases, and whether lubricant is applied or not, strength of the material is not restored. This may explain the breakage of springs that are well lubricated.

FORD CAR OVERHAUL.

(J. T. T., West Newton, Mass.)

I have a Ford 1917 model, which has been run about 3000 miles and seems to be in good condition. How long is it safe to let it run before giving it a thorough overhaul? Which, in your opinion is the best way to have it overhauled, in my own garage by a skilled man, or at a public garage? I have mixed one pint of alcohol and one pint of kerosene with my oil, does this harm the engine?

If you decide to have your car overhauled you should be able to get the work done more cheaply at a garage, as a general rule, for the garage will have all necessary tools, etc., required for work of this sort. There is much of the work in overhauling that can be done in a machine shop much cheaper than by hand.

There is no specific age or mileage that can determine the necessity of an overhaul; road conditions, operation, lubrication and like considerations all enter into such a determination. The writer used his car for nearly 10,000 miles before giving it an overhaul, though he did make many minor adjustments and replacements.

We would not suggest that you run the car until some part wears out, for this might lead to serious trouble. General wear, as indicated by knocks, squeaks or rattles, should be corrected and repaired as soon as the symptoms develop.

It should be an easy matter for you to decide whether a thorough overhaul is required, and if extensive work is not necessary, you should be able to do most of the work yourself. It might even pay you to have an automobile expert go over your car thoroughly and note such repairs as are necessary; possibly he will, with your assistance, make the repairs at your garage, provided they are not excessive.

We would advise you to read the first two stories of the overhauling series, which started in the July 10, 1917, issue of the Automobile Journal. The first story will give you an idea as to making an examination, while the second gives detailed description of the Ford car overhaul.

If the car is running all right and has its maximum of engine power, the first test to be made is to determine whether the compression is good. With the spark turned off crank the engine over slowly and see whether the compression in all of the cylinders is approximately the same. You may find as the engine is slowly turned that the compression leaks from the cylinders.

Remove the cylinder head and examine the valves, grind them if necessary and scrape off all carbon. Be sure that the intake manifold is firmly fitted to the block. Clean the radiating system and scrape the engine water jackets with a wire. Examine the cylinders for scores and scratches.

Remove the two plates from the crank case and examine the main and connecting rod bearings. Any play in the connecting rod bearings can be located by grasping the connecting rod firmly and working it up and down. Play in these members may be compensated by removing shims, though care must be used not to remove too many shims and cause binding.

The crankshaft may be tried for play by working it up and down. Put a jack beneath the crankshaft and by lifting on the jack handle any play may be located. The main bearings may be adjusted by filing the caps, being careful not to remove too much metal.

The Ford car transmission, unless much abused, will last fully as long as the car itself. The bands, and possibly the plates, wear to a certain extent. This unit may be examined by removing the entire top, together with the pedals.

If the transmission is noisy on low or reverse gears, it

may be essential to replace the gears, but this is very seldom necessary. Jack up both rear wheels and try the three speeds. By listening to the transmission, as well as the rear axle the amount of noise will show whether repairs are necessary.

With a few special tools you should be able to make practically all of the necessary repairs yourself in your own garage, and unless it has had hard use, a full overhaul should not be required.

We would advise you to use the lubricating oil clear rather than diluting it with alcohol or kerosene. If the oil you are in the habit of buying is too heavy for your car, it would be better for you to get a lighter grade. Alcohol and kerosene are bad liquids to be mixed with lubricant. At present much of the wear and carbonization of gasoline engines is directly caused by kerosene in the fuel.

Lubricating oil is sold by makers who have spent much time and study perfecting their product. Many of the manufacturers maintain large experimental laboratories where the oil is subjected to all kinds of tests, and it is fairly safe to say that they spare no expense to produce what they think is a perfect lubricant. It is not, therefore, advisable to add any liquid, such as alcohol or kerosene, which are not lubricants, but quite the opposite.

STORAGE BATTERY ELECTROLYTE.

(L. A. J., Philadelphia, Pa.)

In all storage battery instructions the makers recommend that distilled water be used. Would it not be possible to use snow or ice water? None of the books say anything about the adding of electrolyte. I should think that if the battery was partially discharged I could add stronger electrolyte and bring the specific gravity back again, thus restoring the charge. Would this be so? Why is it that the books suggest the addition of water only? Where does the acid go to?

Snow or ice water will, in most cases, contain a certain amount of impurities, animal or vegetable matter, or mineral salts, which in time are certain to damage the battery plates. In falling through the air snow often collects impurities and, though it may be pure in the clouds, it quickly combines with foreign substances in the air. Distilled water is so easy to obtain and costs so little that to use impure water is not worth the risk.

A storage battery contains positive and negative plates, which are separated from each other and are acted upon by the electrolyte only when an outside connection is made. Should an infinitely small bit of metal such as platinum, iron, zinc, tin or copper be introduced into the cell, it will adhere to one of the plates and form a miniature battery in itself. Electrical action will commence in the cell and on the plate, and the plate will be cut through at the point where the metal happens to be.

Though the specific gravity of a storage battery is usually an indication of the amount of charge in the battery, it does not determine the current in the battery.

We will assume that an electrolyte test indicates a specific gravity of 1.200, and that the battery is being charged from an outside source. The electrolyte contains a certain percentage of sulphuric acid and water. As the battery is charged a substance termed the sulphate radicle is driven from the plates and combines with the water, increasing the specific gravity of the electrolyte. A certain amount of oxygen is liberated by the electrical action and escapes through the vents at the top of the cell. Every time the battery is charged a certain amount of the water vaporizes and must be replaced. The acid itself does not escape, hence no new acid need be added.

As the battery is discharged the sulphate radicle combines with the lead plates, and the specific gravity of the electrolyte falls. In this way the specific gravity acts to a certain extent as an index of the battery charge and discharge.

Suppose the electrolyte tested at a specific gravity of 1.200 in a partially discharged cell, and, following your suggestion, strong acid were added to bring the specific gravity up to say 1.300, which is practically an indication of a full charge. Since the plates have absorbed the sulphate radicle

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Non-Fluid Oil is three times as long-lasting, and durable as any grease at any price. It is the most efficient lubricant in grease form. But it is not a common grease. It is infinitely better, because it starts checking friction the minute it is applied. Non-Fluid Oil does not melt under high temperatures, cannot thin out, or leak from bearings or gears.

Ask your dealer for Non-Fluid Oil. Sold only in orange colored cans. Send today for sample and literature.

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Use Less Gasoline

Actual signed service reports show that the average mileage per gallon of gasoline among Inter-State owners is 17.27 miles. Drive an Inter-State car and use less gasoline.

Sell the Inter-State and save your customers gasoline. Write for our dealers' plan.

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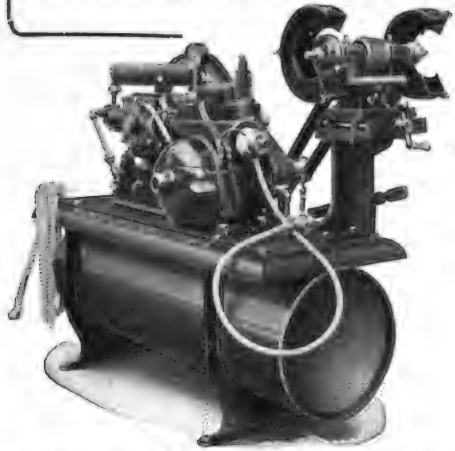
Worcester, Mass.
Detroit, Mich.

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This buffing or grinder head is made according to the most approved design and is suitable for handling tire roughing wheels and polishing or grinding wheels. It will handle two wheels of eight-inch diameter and the construction is as strong and rigid as could be desired or required.

The motor is of sufficient capacity and the entire machine so designed as to permit the compressor and wheel head to be operated together or singly.

Automatic controls prevent overcharging of the air tank and the entire construction of the unit is as near fool proof as possible.



A New Money Saver for Garage and Tire Shop

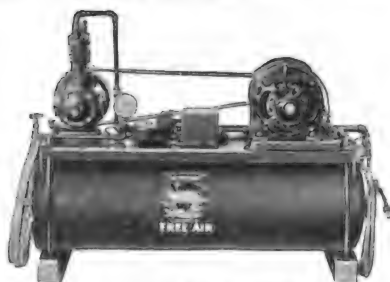
AT THE New York Auto Show tire repair and garage men saw, for the first time, a machine that exactly meets a crying need they had experienced for a long time. This machine was the **DeLuxe Combined Two Stage Automatic Air Compressor and Buffing or Grinder Head—Two Valuable Machines in One.**

Having known the DeLuxe Air Unit for several years as an unequalled success, and seeing the new improvements incorporated in a manner that assured absolutely satisfactory results, it is needless to say that an unprecedented number of orders were placed at once.

Every tire shop requires air facilities and tire roughing equipment, while every garage must have free air service and grinding wheel facilities. The practise has necessarily been to buy an air compressor with a motor and a buffing head with a motor or countershaft equipment from which to run it.

This new DeLuxe unit combines all this necessary equipment in one machine, to the definite and valuable advantage of purchasers. It saves the cost of an extra motor, avoids the necessity of buying a countershaft, conserves valuable floor space, saves expense in installation and gives results not only equal, but superior to the old method.

The many advantages of this new unit are described in detail in a special circular just issued. Write for a copy today.



U. S. Single Stage Automatic Air Unit Equipment D22

Cap. 2½ Cu. Ft. Per Minute.

An automatic single stage outfit for maintaining a supply of air ready for use at any time. Suitable for garage, free air service, etc.

See Our Exhibit at the Auto Shows

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Boston—Space 518

Mechanics Building
March 2 to 9

The United States Air Compressor Co.
6538 Carnegie Ave. Cleveland, O.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

from the old solution, they have reached a point where they will absorb but little more of the sulphate radicle. The addition of the sulphuric acid will not restore the charge, for the plates are not in what might be called a receptive condition.

In a case of this sort the only method of recharging the cell is by electrolysis, or the passage of electrical current through the plates to reduce the sulphation.

SPOT LIGHT INSTALLATION.

(R. M., Indianapolis, Ind.)

I have a six-volt spot light that I would like to connect with the lighting circuit on my Chandler 1915 car. Will you kindly tell me how to connect this light so that I will not burn out any of the fuses or spoil the units?

There are two places where you may connect the spot light and get results. The first at the battery, the second at the lighting switch.

If the spot light is fitted with independent switch you may connect the two wires leading from it with the two poles of the storage battery. By this method you will have no fuse protection, however, and, should the light short circuit for any reason, the battery will deteriorate very quickly.

We would recommend that you connect it with the tail light circuit either at the junction block or at the lighting switch. Trace the wire leading from the tail light and find where it is connected with the junction block and to this terminal attach one lead of the spot light; the other lead of the spot light should be grounded to the frame of the car at any convenient point, taking care to make a clean connection.

From the junction block a wire leads to the lighting switch. If you so desire, you may make the connection with the spot light at the lighting switch instead of at the junction block.

STRIPPED STARTER GEARS.

(H. B., Boston, Mass.)

About a week ago, when I tried to use the self-starter on my ——— car, I found that it ran with a great deal of grinding and buzzing, but did not seem to turn the flywheel over. Upon inspection I found that three of the teeth on the flywheel had been broken out, and since then I have been obliged to use the hand crank for starting, for the engine would turn over to the broken teeth and the gears would clash. Is there any way to make a repair without replacing the whole flywheel, as the teeth are cast integral with the wheel?

There are two possible repairs, either of which should be permanent and cost much less than the replacement of the entire flywheel. In any event the flywheel must first be removed from the car and given a thorough cleaning with kerosene oil and a stiff brush.

If you are located near an oxy-acetylene welding shop you may be able to have new teeth welded into place and finished up by filing or on a machine at a very nominal figure. Many welding shops make a specialty of gear welding, for gears frequently come from the foundry with imperfect teeth and welding is the easiest solution.

There is another repair that is frequently made on steel gears. The old gear tooth is entirely removed from the rim and a dovetail cut into the rim into which a new tooth is inserted. This new tooth is riveted or pinned into place and constitutes a repair nearly as good as a new flywheel.

J. F. GUIDER WILL HAVE CHARGE OF CADILLAC PLANT.

John F. Guider, who has been an executive with the Pierce-Arrow Motor Car Co. for the past 12 years, has been elected vice president of the Cadillac Motor Car Co. in charge of manufacturing.

Mr. Guider, who was factory superintendent with the Pierce-Arrow company, is a New Englander by birth. He started work when only 11 years of age and served his ap-

prenticeship as a tool maker with the Yale Lock Co., now the Yale & Towne Manufacturing Co. of Stamford, Conn. Later he worked at building, installing and testing marine engines. He also worked for the American Graphophone Co. at Bridgeport, Conn., and as a mechanical expert in a New York patent office. He also did research work for the Union Typewriter Co.

In 1905 he went to the Pierce Arrow factory and was made superintendent two years later. He resigned late in the year and assumed charge of the production of Cadillac cars in Detroit on Jan. 1.

GENERAL CHASSIS OVERHAUL.

(Continued from Page 16.)

remove the varnish at any point or the unprotected paint will be scraped off.

Successive coats of varnish should be added, each coat allowed to dry fully and then smoothed down with pumice. The number of coats will be determined by the condition of the body. The final coat should be applied with a soft brush, the varnish being rather thick and applied with long, quick strokes of the brush. Varnish dries quickly and unless the greatest speed in applying is used the final coat will show brush marks.

Repairing the Chassis.

In preparing the chassis for painting all of the grease should first be removed and the parts, such as springs, radiator, mudguards and fenders, as well as the body, taken from the chassis. A strong solution of potash lye will remove both grease and loose paint, though the lye should be fully washed from the metal parts before the paint is applied.

After the frame has been washed and fully cleaned a very careful examination should be made. All rivets fastening the cross members should be inspected and tightened if necessary. A loose rivet indicates weakness and should be removed and a new one put in its place. Broken frame members may be detected at this time and either welded or reinforced by new sections.

Where a break occurs in a frame member a reinforcing piece at least 18 inches long should be riveted to the member. Rivet holes should be bored just large enough to permit the entrance of the rivet and the rivets should be put into place and riveted while hot if possible. A word of caution here perhaps will not be amiss for the average autoist may not understand this process.

If a rivet is put into place and riveted over while heated a certain amount of contraction takes place in the rivet and binds the riveted members tightly together. The two members being riveted should not be heated and the rivet should be set as quickly as possible. An experienced riveter takes such a short time to "head over" that the rivet has time to lose but a few degrees of heat.

Before painting the frame all of the bolts which fasten the different units and control rod guides in place should be tightened so as to prevent rattles and squeaks. The springs should be disassembled and the contacting surfaces cleaned free from all rust and polished, then given a good coating of graphite and oil. Do not apply the paint too liberally to the springs or it will work between the leaves and cause friction. If possible, after the spring has been painted and finished it should again be disassembled and any paint that might have worked between the leaves removed.

Finishing the Frame.

Not so much care need be used in finishing the frame as was used on the body, three coats of flat paint and three of varnish should be sufficient.

Unightly holes in the cast iron parts, blisters or cracks in the metal may be filled with an iron cement, obtainable from practically any hardware supply store.

The radiator presents the greatest difficulty in that a thick coat of paint should not be applied. This unit should be given a careful cleaning and scraped with a wire or stiff bristle brush. All grease should be removed with potash lye and a thin coating of flat color applied, any bubbles or paint or blisters should be smoothed off and a second coat applied when the first has dried. A spraying device, such as is used for applying cedar spray, may be used for this work. In-

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STA-TITE Piston Rings

Play an Important Part in the Success of America's Leading Automobiles, Motor Trucks and Tractors.

Every automobile engineer will tell you that the Life, Power, Speed, Hill Climbing Ability and Operating Cost of a gasoline driven vehicle depends on its motor.

The strength and power of any motor depends largely on its compression. Perfect Compression means an efficient, clean, smooth running motor.

A motor without perfect compression is troubled with improper lubrication, lack of power, and an accumulation of carbon.

STA-TITE RINGS give Perfect Compression and overcome these troubles—besides saving on oil, gasoline and repair bills.

STA-TITE RINGS insure proper lubrication and prevent pistons from wearing dry and scoring cylinder.

STA-TITE RINGS are guaranteed to be leak proof.

Dealers You should sell STA-TITE RINGS. The three piece construction assures equal distribution of pressure on cylinder walls.

Remember—STA-TITE RINGS are manufactured by the largest manufacturers of piston rings in the world.

Send NOW—TO-DAY for "TWELVE REASONS" why STA-TITE RINGS will prove to be business builders.



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Makers Also of "Quality" Snap Rings

Universal Motor Truck Accounting System

\$10.00

Will buy a complete, practical system that any one can operate and which contains all forms needed for one year.

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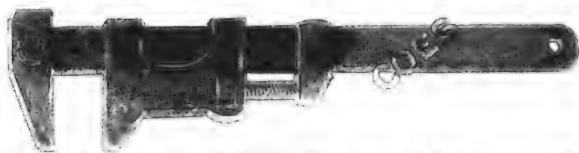
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From these data, operating costs and earnings can be obtained in a few moments. Any clerk can keep the records of one or 100 trucks.

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Your dealer will show you just the size you need for your tool kit, or for repair work.

He will recommend the COES wrenches as all good dealers have done for fifty years.

Coes Wrenches do not break, or wear out, in service life they cost less than any other tool made.

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REMEDY FOR FRICTION

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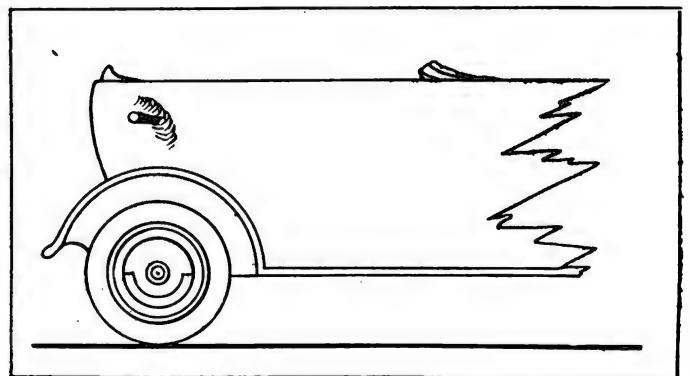
stead of using the mouth for air supply an air pump may be attached to the mouthpiece.

After the flat color has had plenty of time to fully set, one or two coats of enamel may be applied in the same manner. In painting the radiator only enough color and enamel should be added to secure a good finish, for thick coatings of paint have a tendency to reduce the radiating area quite appreciably.

Attending to Squeaks and Rattles.

If it were possible to construct an automobile of one piece much trouble and annoyance might be spared the owner. Such is not possible, however, and the one thing to do is to so fasten all parts as to make them practically one. With the body off the car much can be done to prevent the development of squeaks or rattles, for the repairer is able to inspect every part of the chassis and underneath part of the body. Wherever two pieces of wood are joined together by bolts and there is any danger of their working loose the contacting surfaces should be lubricated with wax prepared as follows:

Fill a large pan with boiling water and after being sure that there is no open blaze near, place a smaller can half filled with gasoline into the large pan. Into the gasoline shave up a quantity of paraffine, or as much as the gasoline will dissolve, then remove the smaller can and add two teaspoonfuls of gasoline to prevent the mixture from solidifying when it cools. This may be applied with a brush and will soak into the wood, forming a permanently lubricated surface. Wherever wood contacts with metal this mixture may be used, but is not efficient where metal contacts against metal.



Where a Bend Occurs In an Inaccessible Place a Bar May Be Soldered to the Metal and the Dent Reduced by Twisting or Pulling on the Bar.

Where the body is attached to the chassis leather pads should be inserted, if possible, to prevent squeaks from developing. Many body builders run a long strip of heavy felt along the frame, thus preventing direct contact between frame and body. A paste composed of powdered graphite and oil is recommended for contacting metal surfaces and where leather washers or strips cannot be inserted.

A common cause for a noisy chassis is poorly fitted mudguards and fenders. The continued action of pull and twist throughout the whole machine quickly loosens bolts and nuts and rattles and squeaks soon develop. The repair man should take the greatest of care in fitting the guards and metal parts into place. Lock washers under the nuts should be inserted wherever possible.

NOTE—We have received a great number of letters from our subscribers telling of their appreciation for our overhauling stories. We would like to hear from many more. Are the stories helpful to you? Are the majority of our readers interested in seeing this series continued? Every reader who cares for the continuance of these stories should write us, giving the name of the car he most desires to see described. Cooperation on the part of our readers is essential for the success of these stories. Write your letter now.—EDITOR.

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LONGEVITY

The purchaser of a Pierce-Arrow secures a car of life-long durability at a cost which, when spread over years of service, over continents of travel, is insignificant. Its natural age is greater than that of lesser cars, just as the natural age of the oak is greater than that of the birch. It has not yet realized all of its potential mileage because it is still too young. Frequent requests for instruction books for Pierce-Arrow cars built eight, nine or ten years ago show that cars at least that old are starting service anew in the hands of new owners.

THE PIERCE · ARROW MOTOR CAR CO · BUFFALO N Y

PIERCE- ARROW



Unretouched Midnight Photograph by Fowler, Evanston, Ill.

The Perfect Light for Night Driving

It solves the *glare* problem, because it has no glare—absolutely none—but what is more important, it makes night driving *safe* and enjoyable—it obviates the need of dimmers, spotlights, auxiliary headlights and high candle power bulbs which drain the batteries and impair ignition.

You can now drive at night—just as safely—just as fast as in daytime—without constant fear of danger, without stopping and dimming your headlights to allow another car to pass. The SHALER Roadlighter lights the *entire* road—from fence to fence—with a bright, white, evenly distributed light.

The SHALER Roadlighter has been subjected to the most rigid tests by illuminating experts.

State, city and police officials have given this remarkable lens their approval—accident insurance companies endorse and recommend it.

We have tested it so thoroughly—that we absolutely guarantee every pair of SHALER Roadlighters.

SHALER ROADLIGHTER

*Pierces the Glare of Approaching Headlights
Illuminates the Ditches
Accurate Focusing Unnecessary
Easy to Keep Clean*

*Shoots the Light Far Ahead
Legal Everywhere
Rays Penetrate Fog and Dust
Easy to Install*

Limited Offer to Dealers Only

We want every automobile accessory dealer in the United States to try out a pair of SHALER Roadlighters on his own car—AT OUR EXPENSE.

Mail the coupon for full particulars regarding this big offer. There is no obligation—don't put it off—clip and mail coupon *now*.

C. A. Shaler Company
9250 Fourth St. Waupun, Wis.

Dealers' Offer Coupon

C. A. SHALER CO., 9250 Fourth St., Waupun, Wis.

Gentlemen: Send me full particulars about your offer to let dealers try out a pair of SHALER Roadlighters at your expense. This obligates me in no way.

Name

Address

City and State

My Jobber's Name Is

NOV 21 1913

